

Chilton's Harley-Davidson V-Twins

REPAIR & TUNE-UP GUIDE

SECOND EDITION

**Sportster 900 and 1000
Electra Glide, Super Glide models
from 1965-1974**





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CHILTON'S Repair and Tune-Up Guide

Harley-Davidson V-Twins

ILLUSTRATED *Second Edition*

DISCARD

Prepared by the

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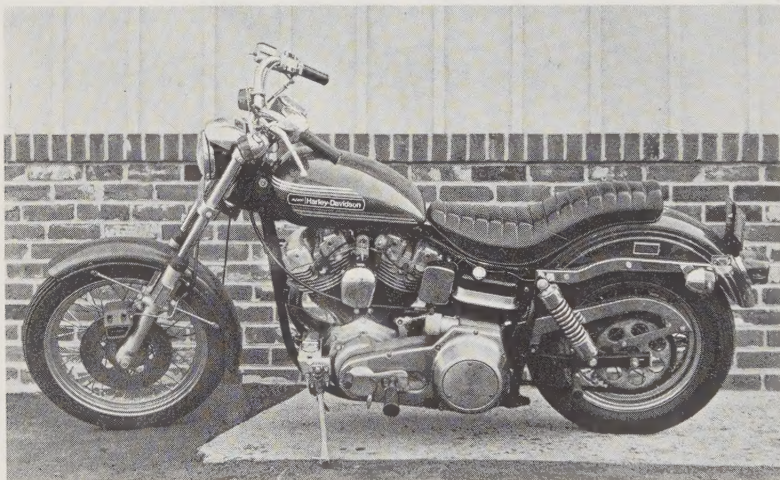
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often not enough. Even if you are only doing routine maintenance quality tools are of great importance. You should have the following tools in your box:

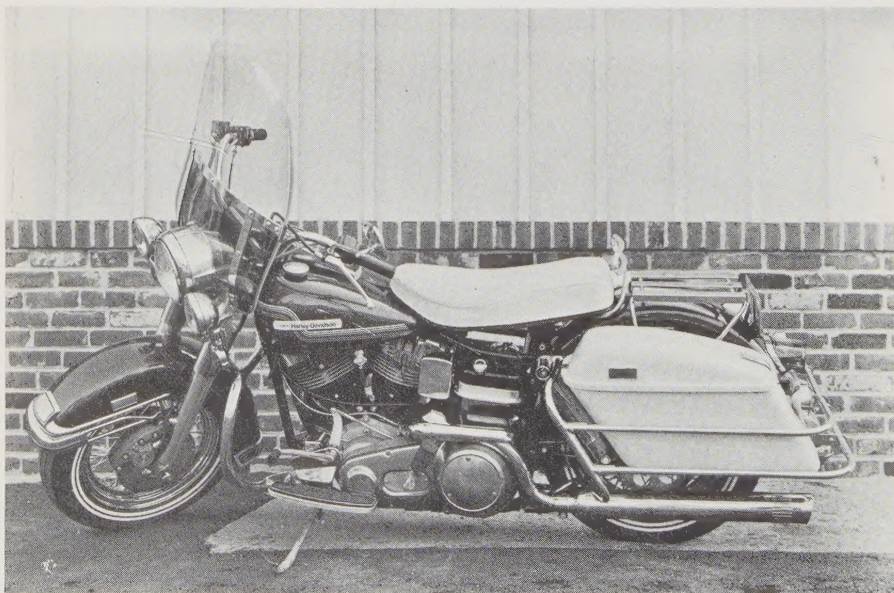
- a. Screwdrivers: both phillips and slot head;
- b. Wrenches; a set of open-end and box type;
- c. Socket wrenches: a set which covers $\frac{3}{8}$ to 1 in.;
- d. Allen wrenches;
- e. A complete set of feeler gauges;
- f. A torque wrench;
- g. An impact driver with phillips and slot head bits.

With these tools you are ready to start. As time goes on you will be able to tackle more complex operations which will require more tools. When referring to this manual, be sure to read the procedure thoroughly before beginning any work, as this will tell you what special tools (if any) are needed to successfully complete the operation.

Always have on hand a good supply of clean rags and a solvent (kerosene or the like; never use gasoline). Keep your tools neatly arranged and work area clear. This will minimize the danger of losing a small part which may have dropped to the ground.



Super Glide, FX



Electra Glide, FLH

General Specifications

<i>Sportster</i>	<i>XL, XLH</i>	<i>XLCH</i>	<i>XLH (1000 cc)</i>	<i>XLCH (1000 cc)</i>
DIMENSIONS				
Wheelbase (in.)	①	57	58½	58½
Overall Length (in.)	②	83¼	87¼	87¼
Overall Width (in.)	34	③	33	32
Overall Height (in.)	40½	42	40½	42
Ground Clearance (in.)	④	⑤	6¾	6½
CAPACITIES				
Fuel Tank (U.S. gal.)	4.0	2.2	4.0	2.2
Oil Tank (quarts)	3	3	3	3
Transmission (pints)	1½	1½	1½	1½
ENGINE				
Number of Cylinders	2	2	2	2
Type	45 degree, V-type, four-cycle, OHV			
Horsepower	⑥	⑦	⑧	⑨
Bore (in.)	3.00	3.00	3.188	3.188
(mm)	76.2	76.2	81	81
Stroke (in.)	3.8125	3.8125		
(mm)	76.2	76.2		
Piston Displacement (cu in.)	53.9	53.9	60.9	60.9
(cc)	883	883	997.5	997.5
Torque	⑩	⑩	52 ft lbs @ 3800 rpm	
Compression Ratio	⑪	⑪	9.0 : 1	9.0 : 1
TRANSMISSION				
Type	Constant mesh-foot shift			

General Specifications (cont.)

<i>Sportster</i>	<i>XL, XLH</i>	<i>XLCH</i>	<i>XLH (1000 cc)</i>	<i>XLCH (1000 cc)</i>
GEAR RATIOS				
First gear	10.63 : 1 ^⑫	10.63 : 1 ^⑫	11.16 : 1	11.16 : 1 ^⑬
Second gear	7.69 : 1	7.69 : 1	8.08 : 1	8.08 : 1
Third gear	5.82 : 1	5.82 : 1	6.11 : 1	6.11 : 1
Fourth gear	4.21 : 1	4.21 : 1	4.42 : 1	4.42 : 1
First gear		11.74 : 1 ^⑭		
Second gear		8.50 : 1		
Third gear		6.43 : 1		
Fourth gear		4.66 : 1		
<i>Sportster</i>	<i>Front</i>		<i>Rear</i>	

TIRE DATA

XL, XLH (1965-66)	3.50 x 18	3.50 x 18
XLH (1967-1969)	3.25/3.50 x 19	4.00 x 18
XLCH (1969 & earlier)	3.25/3.50 x 19	4.25 x 18
XLH (1970 & later)	3.75 x 19	4.25 x 18
XLCH (1970 & later)	3.75 x 19	4.25 x 18

- ① Wheelbase (in.)
1965-66: 56½
1967 and later: 58½

② Overall length (in.)
1965-66: 87
1967-72: 89

③ Overall width (in.)
1965-66: 29½
1967 and later: 34

④ Ground Clearance (in.)
1965-66: 2½ (min.)
1967 and later: 6¾

⑤ Ground Clearance (in.)
1965-66: 4¼ (min.)
1967 and later: 6¾

⑥ Horsepower
XL: 42 bhp @ 5500 rpm
XLH: 55 bhp @ 6300 rpm
XLH (1970-71): 58 bhp @ 6800 rpm

⑦ Horsepower
XLCH (1969 and earlier): 55 bhp @ 6300 rpm
XLCH (1970-71): 58 bhp @ 6800 rpm
- ⑧ Horsepower
XLH (1972 and later): 61 bhp @ 6200 rpm

⑨ Horsepower
XLCH (1972 and later): 61 bhp @ 6200 rpm

⑩ Torque
XL: 48 ft lbs @ 3600 rpm
XLH: 52 ft lbs @ 3800 rpm

⑪ Compression Ratio
XL: 7.5 : 1
XLH: 9.0 : 1

⑫ Gear Ratio
XL & XLH: 1965-66
XLH & XLCH: 1967 (optional)

⑬ Gear Ratio
XL & XLH: 1967 and later (standard)

⑭ Gear Ratio
XLCH: 1970-71

General Specifications

<i>Glide Models</i>	<i>FL & FLH (1969 & earlier)</i>	<i>FL & FLH (1970 & later)</i>	<i>FX</i>
DIMENSIONS			
Wheelbase (in.)	60.0	61.5	62.7
Overall Length (in.)	92.0	89.0	92.0
Overall Width	35.0	38.5	33.0
CAPACITIES			
Fuel Tank (large) (U.S. gal.)	5.0	5.0	3.6
(small) (U.S. gal.)	3.5	3.5	
Reserve Tank (large) (U.S. gal.)	1.2	1.2	0.7
(small) (U.S. gal.)	1.0	1.0	—
Oil Tank (quarts)	4	4	4
Transmission (pints)	1.5	1.5	1.5
ENGINE			
Number of Cylinders	2	2	2
Type	45 degree, V-type, four-cycle, OHV		
HORSEPOWER (bhp)			
FL	57 @ 5200 rpm	57 @ 5200 rpm	
FLH	66 @ 5200 rpm	66 @ 5200 rpm	
FX			66 @ 5200 rpm
Bore (in.)	3 ⁷ / ₈	3 ⁷ / ₈	3 ⁷ / ₈
(mm)	87.3	87.3	87.3
Stroke (in.)	3 ³¹ / ₃₂	3 ³¹ / ₃₂	3 ³¹ / ₃₂
(mm)	100.8	100.8	100.8
Piston Displacement (cu in.)	73.66	73.66	73.66
(cc)	1207	1207	1207

General Specifications (cont.)

<i>Glide Models</i>	<i>FL & FLH (1969 & earlier)</i>	<i>FL & FLH (1970 & later)</i>	<i>FX</i>
TORQUE (ft lbs)			
FL	62 @ 3200 rpm	62 @ 3200 rpm	
FLH	65 @ 3200 rpm	65 @ 3200 rpm	
FX			65 @ 3200 rpm
COMPRESSION RATIO			
FL	7.25 : 1	7.25 : 1	
FLH	8.00 : 1	8.00 : 1	
FX			8.00 : 1
TRANSMISSION			
Type	Constant mesh, hand or foot shift		
GEAR RATIOS (Internal) Three-Speed			
First Gear	2.71 : 1	2.71 : 1	
Second Gear	1.50 : 1	1.50 : 1	
Third Gear	1.00 : 1	1.00 : 1	
Reverse	2.66 : 1	2.66 : 1	
Four-Speed			
First Gear	3.00 : 1	3.00 : 1	3.00 : 1
Second Gear	1.82 : 1	1.82 : 1	1.82 : 1
Third Gear	1.23 : 1	1.23 : 1	1.23 : 1
Fourth Gear	1.00 : 1	1.00 : 1	1.00 : 1
NUMBER OF SPROCKET TEETH			
Clutch	37	37	37
Transmission	22	22	23
Rear Wheel	51	51	51

General Specifications (cont.)

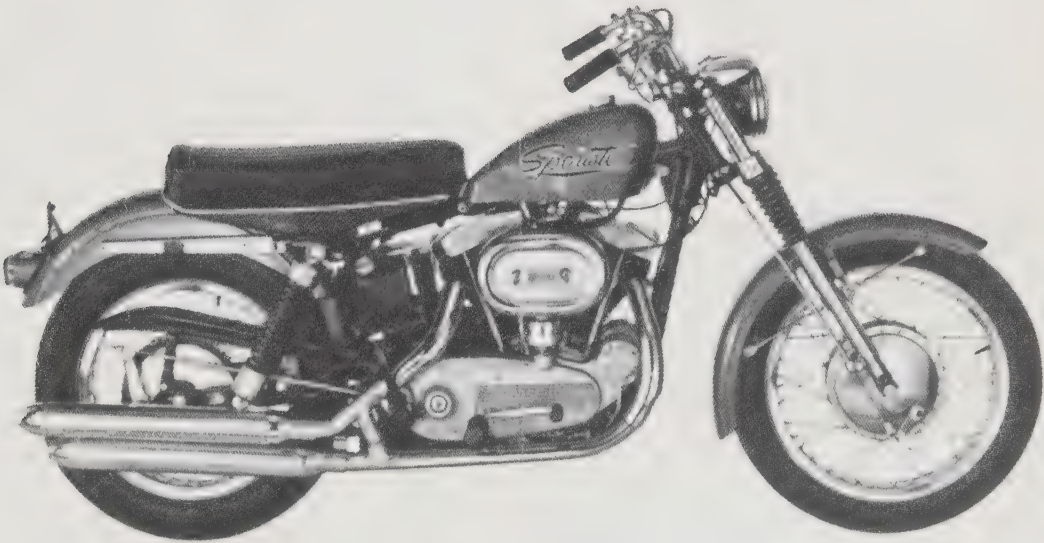
<i>Glide Models</i>	<i>FL & FLH (1969 & earlier)</i>	<i>FL & FLH (1970 & later)</i>	<i>FX</i>
NUMBER OF SPROCKET TEETH			
Engine—Three-Speed Trans.			
(Solo) FLH	24	24	
FL	23	23	
(Sidecar) FLH	22	22	
FL	19	19	
Four-Speed			
(Solo)	23 ³ / ₂₄	23 ³ / ₂₄	23 ³ / ₂₄
(Sidecar)	22	22	22
OVERALL GEAR RATIOS (Three-Speed) (Solo)			
FLH			
First Gear	9.69	9.69	
Second Gear	5.36	5.36	
Third Gear	3.57	3.57	
FL			
First Gear	10.01	10.01	
Second Gear	5.60	5.60	
Third Gear	3.73	3.73	
FLH (Sidecar)			
First Gear	10.57	10.57	
Second Gear	5.84	5.84	
Third Gear	3.90	3.90	
FL			
First Gear	12.20	12.20	

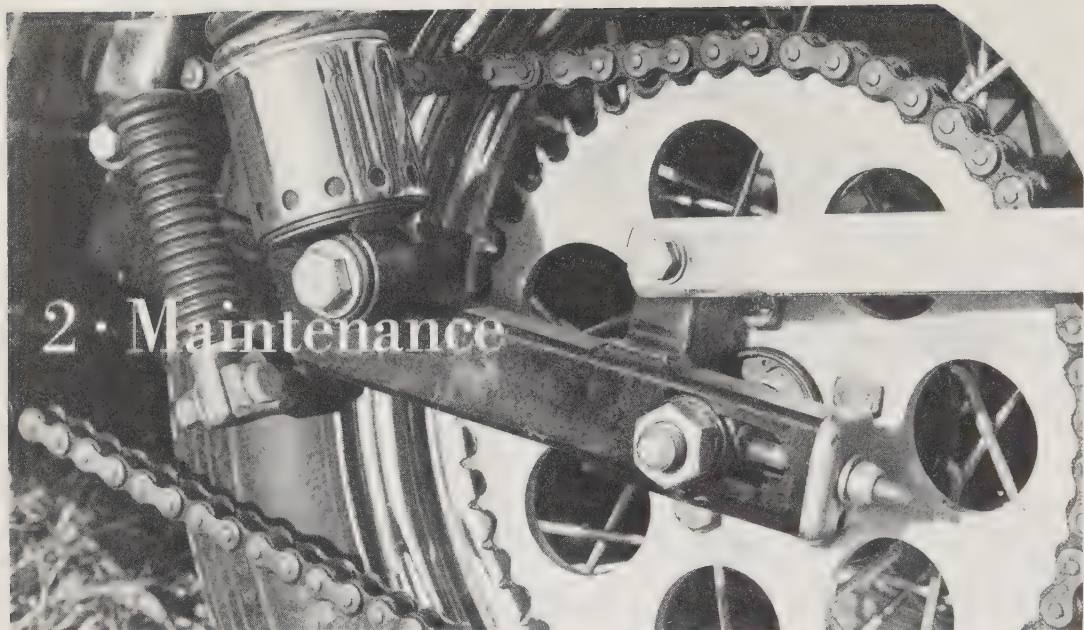
General Specifications (cont.)

<i>Glide Models</i>	<i>FL & FLH (1969 & earlier)</i>	<i>FL & FLH (1970 & later)</i>	<i>FX</i>
OVERALL GEAR RATIOS (Three-Speed) (Solo)			
FL			
Second Gear	6.75	6.75	
Third Gear	4.50	4.50	
(Four-Speed) (Solo) (23-tooth engine sprocket)			
First Gear	11.19	11.19	10.71
Second Gear	6.79	6.79	6.51
Third Gear	4.59	4.59	4.40
Fourth Gear	3.73	3.73	3.57
(24-tooth engine sprocket)			
First Gear	10.74	10.74	10.25
Second Gear	6.50	6.50	6.24
Third Gear	4.39	4.39	4.21
Fourth Gear	3.57	3.57	3.42
(Sidecar)			
First Gear	11.69	11.69	11.20
Second Gear	7.09	7.09	6.80
Third Gear	4.79	4.79	4.60
Fourth Gear	3.90	3.90	3.73
TIRE DATA			
Front	5.10 x 16	5.10 x 16	3.75 x 19
Rear	5.10 x 16	5.10 x 16	5.10 x 16

General Specifications (cont.)

<i>Glide Models</i>	<i>FL & FLH (1969 & earlier)</i>	<i>FL & FLH (1970 & later)</i>	<i>FX</i>
TIRE PRESSURE			
Solo—front (psi)	20	20	24
rear (psi)	18	18	24
One Passenger			
front (psi)	20	20	26
rear (psi)	18	18	26
Sidecar			
front (psi)	22	22	
rear (psi)	26	26	
sidecar (psi)	20	20	





Oil Changes and Lubrication

CHANGING ENGINE OIL

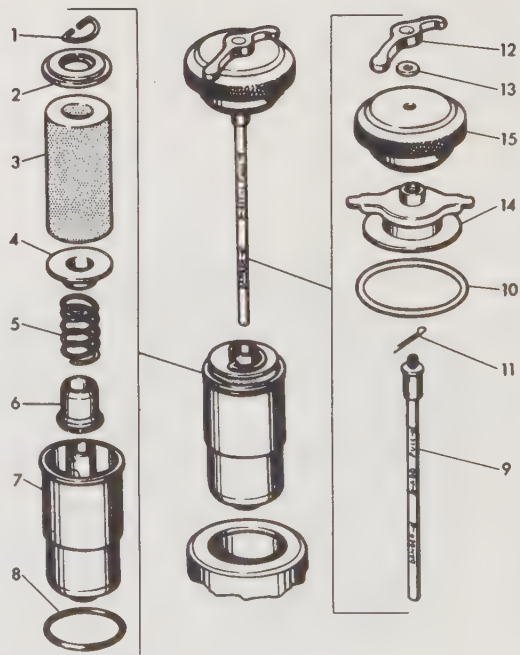
1. Run the engine until normal operating temperature is reached.

2. Position the motorcycle so that it will stand straight up or lean slightly to the right.

3. Remove oil filter cap and drain plug in oil tank. Turn the engine over a few times to remove any oil remaining in the sump. It is not necessary to drain the crankcase as there is only a small amount of oil remaining.

4. Install drain plug. Pour one quart of kerosene into the oil tank. Rock the mo-

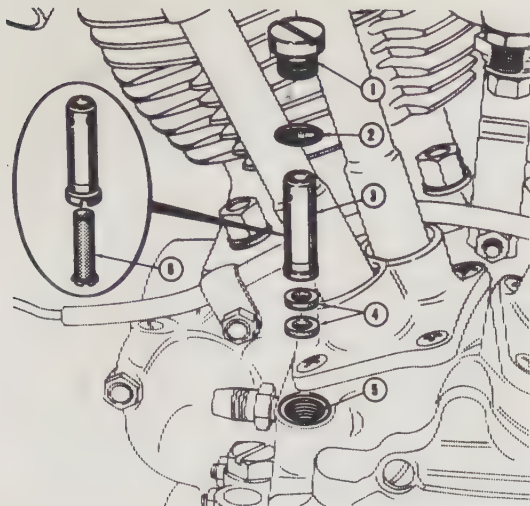
Harley-Davidson Oil	Grade	Air Temperature
Special Light	58	Below 40 degrees F
Medium Heavy	75	Above 40 degrees F
Regular Heavy	105	Demanding usage at high temperatures



Oil tank filter

1. Filter clip
2. Cap seal washer
3. Filter element
4. Filter lower retainer
5. Cup spring
6. Cup seal
7. Cup
8. O-ring

9. Dipstick and valve assembly
10. Cap gasket
11. Cap cotter pin
12. Capscrew
13. Cap washer
14. Capnut
15. Cap top



Hydraulic pushrod screen

1. Oil screen body cap
2. Oil screen body gasket
3. Oil screen body
4. Crankcase body seal (2)
5. Crankcase oil screen body hole
6. Crankcase oil screen

torcycle gently from side-to-side. Remove drain plug and drain kerosene from oil tank.

5. Clean oil filters thoroughly and dry by blowing them with compressed air.

6. Reinstall drain plug and add proper quantity and grade of oil.

CHANGING TRANSMISSION OIL

1. Stand the motorcycle upright and remove the oil level plug from the chaincase bottom.

2. Fill the transmission through the large screw hole in the chaincase cover with engine oil until overflow begins from the oil level plug hole.

3. Secure both plugs when overflow ceases.

4. Change oil annually or every 5,000 miles.

CHANGING FORK OIL

Fork oil must be changed with some regularity to protect the suspension components, especially the oil seals. The filler caps and drain plugs must be removed, and the tube end bolts must be loosened several turns (if applicable). Compressing the forks will aid both the draining and filling operations.

When adding oil, use a funnel. Be sure

to add it slowly and allow all of it to drain into the bottom of the forks.

Add 6.5 oz. to each leg for routine changes, and 7.0 oz. if the forks have been disassembled. Use Harley-Davidson Fork Oil or hydraulic brake fluid.

PRIMARY CHAIN LUBRICATION

Sportster

The Sportster's primary chain is automatically oiled through a port between the chain and transmission compartments.

Glide Models

Oil is supplied to the primary drive chain through an oil line which is connected to metering orifice in the oil pump.

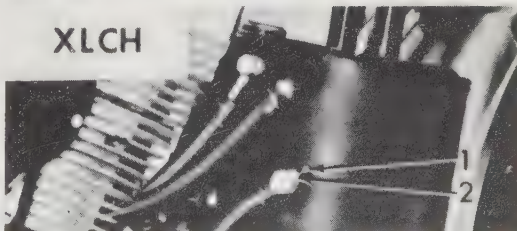
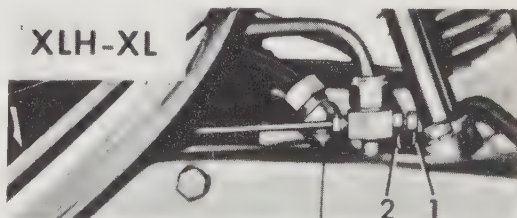
DRIVE CHAIN LUBRICATION

1. Loosen the oiler screw locknut and turn the adjusting screw to the right to decrease flow, and to the left to increase flow.

NOTE: *It is important that the screw is never moved more than a fraction. Small adjustments make a great difference in oil flow.*

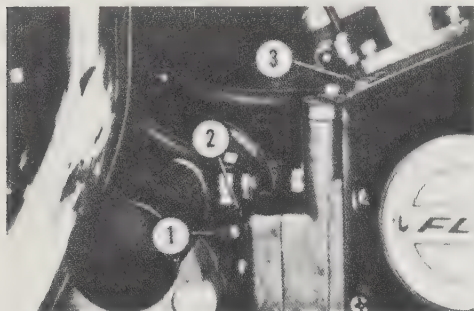
2. Hold adjusting screw with screwdriver and tighten locknut.

3. Check for proper rate of flow. Oil should be deposited on chain at the rate of two or three drops a minute.



Sportster drive chain oiler

1. Adjusting screw
2. Adjusting screw locknut



Glide Models drive chain oiler adjustment points

1. Rear chain oiler adjusting screw
2. Rear chain oiler adjusting screw locknut
3. Cover plug

CHAIN OILER MAINTENANCE

The primary oiler needs no attention. The drive chain oiler requires the following service every 2,000 miles:

1. Back off locknut as far as possible.
2. Count the number of turns it takes before the adjusting screw reaches its seat.
3. Remove the screw and clear the line with compressed air.
4. Replace the adjusting screw. Normal operating setting is $\frac{1}{4}$ turn open. Refer to "Drive Chain Lubrication" for corrective adjustments.

FRAME LUBRICATION

Frame lubrication should be done with a pressure type grease gun. Apply lubricant at points specified in "Periodic Maintenance" charts. Lubricate the brake parts sparingly or shoes may become greasy.

CABLE LUBRICATION

Using a light motor oil or a molybdenum or graphite-based lubricant specifically designed for this purpose, lubricate the cable until a small amount leaks out opposite end. Lubricate all control cables at intervals called for in "Periodic Maintenance" chart at the end of this chapter.

Cleaning

WASHING AND WAXING

In the interest of proper maintenance and obtaining long service from your mo-

torcycle, keep everything clean and well waxed.

Wash the motorcycle with a mild soap and sponge. If there are heavy deposits on the engine or other areas, use a degreaser. Do not allow the degreaser to stand on painted surfaces or rubber or plastic parts for any length of time. Be cautious not to soak spark plug leads or air cleaner; cover if necessary. When washing is complete, ride the motorcycle for a short period to dry vital parts. Check drive chain to ensure that there is proper lubrication.

Wax painted and chromed surfaces with a high quality automotive wax.

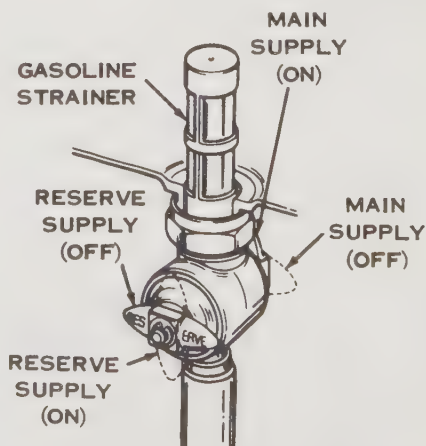
Service Checks and Adjustments

FUEL STRAINER

The fuel strainer is located in the top of the supply valve inside of the fuel tank. The strainer can be cleaned in the following manner:

1. Drain the fuel tank.
2. Remove the supply valve.
3. Remove the dirt lying at the lip of the hole where the supply valve was removed.
4. Clean strainer and blow dry with compressed air.
5. Replace the supply valve.

This operation should be performed every 2,000 miles or when needed.



Fuel strainer on diaphragm type petcock

AIR CLEANER

The air cleaner is so positioned that all air used by the carburetor is first filtered.

The metal mesh-type filter need never be replaced, but should be cleaned every 1,000 miles in a safe solvent and lightly coated with engine oil. For *extremely* dusty conditions, this should be performed every 100 miles or at least once a day.

The corrugated paper-type element should be blown free of dirt every 1,000 miles, or more often in dusty conditions. If the surfaces are oily or sooty, the element can be cleaned with a safe solvent. When the element ceases to come clean, it must be replaced. Never coat it with oil.

The plastic foam-type element uses oil in the same manner as the metal mesh air cleaner and requires service at the same intervals. A sooty surface is normal but when the surface pores become clogged or the surface becomes mottled, cleaning is necessary. Remove the filter from the screen and wash it in a nonflammable solvent. When completely dry, soak it in engine oil, work the oil in until it is an even color, and allow the excess to drain off. The filter is now ready to be replaced.

CABLE LENGTH ADJUSTMENT

Cables stretch over a period of time and it is necessary to make adjustments periodically. It is important to leave some play in the cable to avoid snapping off the ferrule. On cables with adjusting devices, make sure you leave some play and that the locknut is securely fastened. On cables without these devices (i.e., throttle cables) adjust by loosening the cable clevis and pulling the cable through until the desired play is left. Make sure that the loose end of the cable will not interfere with the free operation of any other parts.

CLUTCH ADJUSTMENT

Glide Models

FOOT CONTROL ADJUSTMENT

1. Remove chain housing cover.
2. Place the foot pedal in the fully engaged position (toe down).
3. Loosen the pushrod adjusting screw locknut, and turn the adjusting screw

until the end of the clutch release lever has about $\frac{1}{8}$ in. free-play before the clutch disengages. Turning the screw to the right will decrease the movement and to the left will increase the movement.

4. Secure the locknut while holding the adjusting screw with a screwdriver and recheck the adjustment.

5. Check that there is $\frac{1}{4}$ in. clearance between the lever and the starter drive housing.

6. The foot pedal should clear the bearing cover to prevent the rod from bending.

HAND CONTROL ADJUSTMENT

1. Loosen the adjusting sleeve until there is about $\frac{1}{4}$ in. free movement at the hand lever before disengagement begins ($\frac{1}{2}$ in. on 1972 models).

2. Turn the sleeve to the right for less lever play, or to the left for more, and secure the locknut.

3. If the above steps fail to correct the problem, or if the sleeve has already been adjusted all the way out, go on to the following steps.

4. Move the clutch release lever until all the slack in the actuating mechanism has been taken up. You will notice a difference in lever motion.

5. If, at this point, there is not $\frac{3}{8}$ – $\frac{7}{8}$ in. between the lever and the starter motor, take the following steps.

a. Loosen the sleeve locknut and turn the sleeve to the right until it is resting against the locknut.

b. Remove the clutch cover and loosen the pushrod locknut. Turn the adjusting screw clockwise to move the release lever backward, or counterclockwise to move it forward.

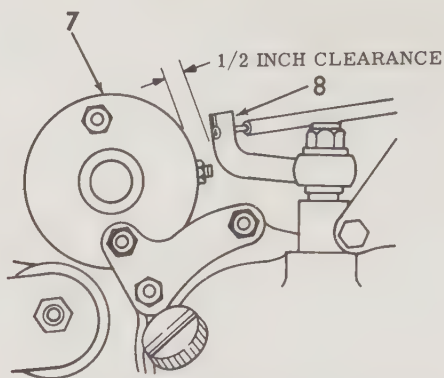
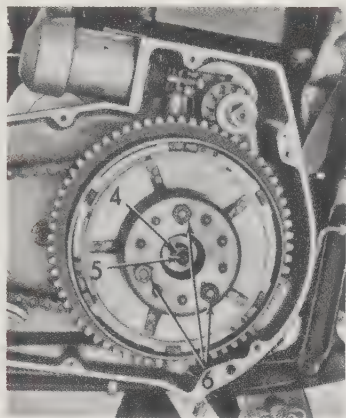
c. Secure the locknut while holding the adjusting screw with a screwdriver when the lever is about $\frac{1}{2}$ in. from the starter motor.

d. Secure the clutch cover using a new gasket and a gasket sealer.

6. Repeat Steps 1 and 2 to complete the adjustment.

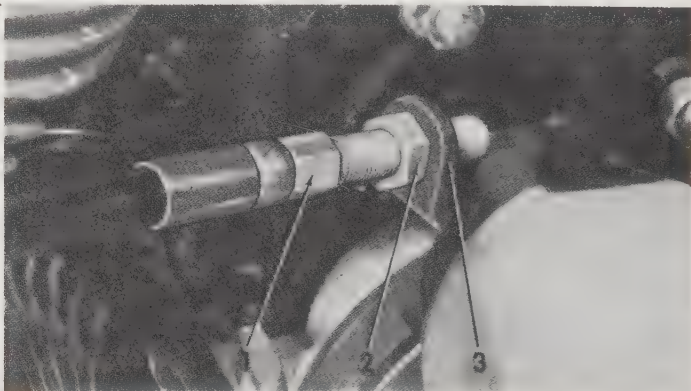
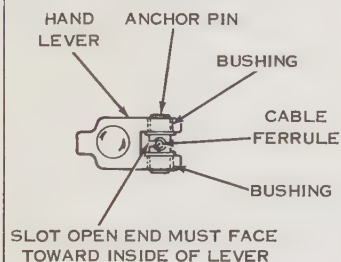
HAND LEVER CABLE REMOVAL AND INSTALLATION

1. Turn the adjusting sleeve to the right until it seats against the locknut.
2. Remove the cable by lifting the fer-



1. Clutch cable adjusting sleeve
2. Sleeve lock nut
3. Bracket
4. Clutch push rod adjusting screw lock

5. Clutch adjusting screw
6. Clutch spring adjusting nuts
7. Starter motor
8. Clutch release lever



Hand clutch adjustment

rule clear of the anchor pin and sliding it through the slot.

3. Replace with the pin slot toward the inside.

4. Replace pin-type assemblies with the open end facing down.

HAND CLUTCH BOOSTER CONTROL ADJUSTMENT

The routine adjustment that is made to maintain the correct amount of hand lever play is done in the following manner:

1. Loosen the control-coil adjusting sleeve locknut and turn the adjusting sleeve to the right until there is one or more inches of play at the hand lever.

2. Loosen the bellcrank adjusting screw locknut and turn in the adjusting screw until the bellcrank will no longer

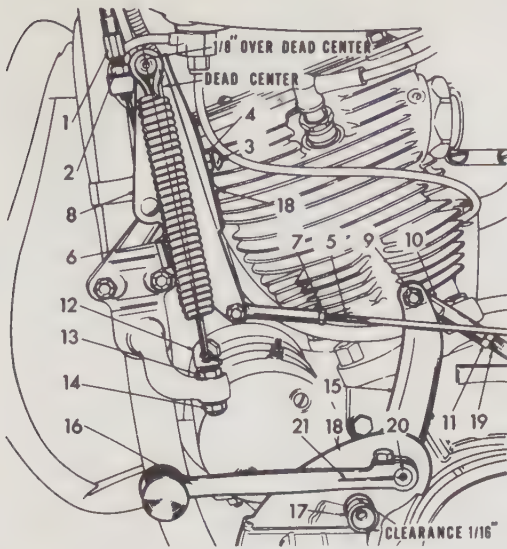
cross top dead center when shifted by hand.

3. Loosen the upper adjuster nut which controls the tension of the clutch booster spring. Loosen it all the way.

4. Slowly turn out the bellcrank adjuster screw and repeatedly check the release position that the crank will assume—moving it by hand—until it remains over top dead center. The crank should reach the end of its travel at about $\frac{1}{8}$ in. over top dead center. Secure with the locknut.

5. Adjust the clutch rod until the release lever has about $\frac{1}{16}$ in. play, and secure the locknut.

6. Back off the adjusting sleeve until the clutch hand lever has about $\frac{1}{2}$ in. play before the clutch begins to release and then secure the locknut.



Hand clutch booster control adjustment

1. Control coil sleeve
2. Control coil adjusting sleeve locknut
3. Bellcrank adjusting screw
4. Bellcrank adjusting screw locknut
5. Clutch lever rod
6. Clutch control booster spring
7. Clutch lever rod locknut
8. Clutch control booster bellcrank
9. Shifter rod end bolt
10. Shifter rod end
11. Shifter rod end locknut
12. Clutch booster spring tension adjuster
13. Clutch booster spring tension upper adjuster nut
14. Clutch booster spring tension lower adjuster nut
15. Gearshifter lever
16. Gearshifter foot lever and rubber pedal
17. Foot lever cover mounting stud (1964 and earlier)
18. Grease gun fittings (2)
19. Shifter rod
20. Foot lever positioning mark
21. Foot lever clamping slot

7. Pull in the clutch hand lever to its stop and tighten the lower adjuster nut for the booster-spring tension until the hand lever remains in. Slowly loosen the nut until the lever returns to the fully extended position.

8. Secure the upper adjuster nut which controls the tension of the booster spring.

The following procedure may help to eliminate hand lever stiffness, failure of the bellcrank to resume its position, or slipping or dragging of the clutch.

1. Back off the clutch lever rod locknut and adjust the rod until the actuating lever has about $\frac{1}{2}$ in. of play.

2. Move the actuating lever forward until all slack is taken up.

3. Check and make sure that there is a $\frac{1}{4}$ in. clearance between the lever rod and chain housing.

Sportster

CLUTCH CABLE AND RELEASE MECHANISM ADJUSTMENT

1. Loosen the locknut on the sprocket cover.

2. Insert a screwdriver and turn the clutch adjusting screw counterclockwise.

3. Placing the hand lever in the fully extended position should seat the releasing worm inside the sprocket cover.

4. Check the cable for binding within its housing if the hand lever doesn't fully return to its seat.

5. Turn the cable adjusting sleeve at the hand lever until the worm almost reaches its stop.

6. Turn the adjusting screw clockwise until there is play in $\frac{1}{8}$ of the hand lever's total movement. This is indicated by slightly increased tension on the lever as it approaches the released position.

7. While holding the adjusting screw steady, secure the locknut. Test-ride the motorcycle to check for slipping or dragging.

CLUTCH SPRING ADJUSTMENT

1. Disconnect the battery ground wire from the negative terminal on XLH models.

2. Remove the left footrest and rear brake lever from their splined shafts.

3. On 1966 and earlier models, remove the stoplight switch from its mount, without disconnecting the wires, and place it out of the way.

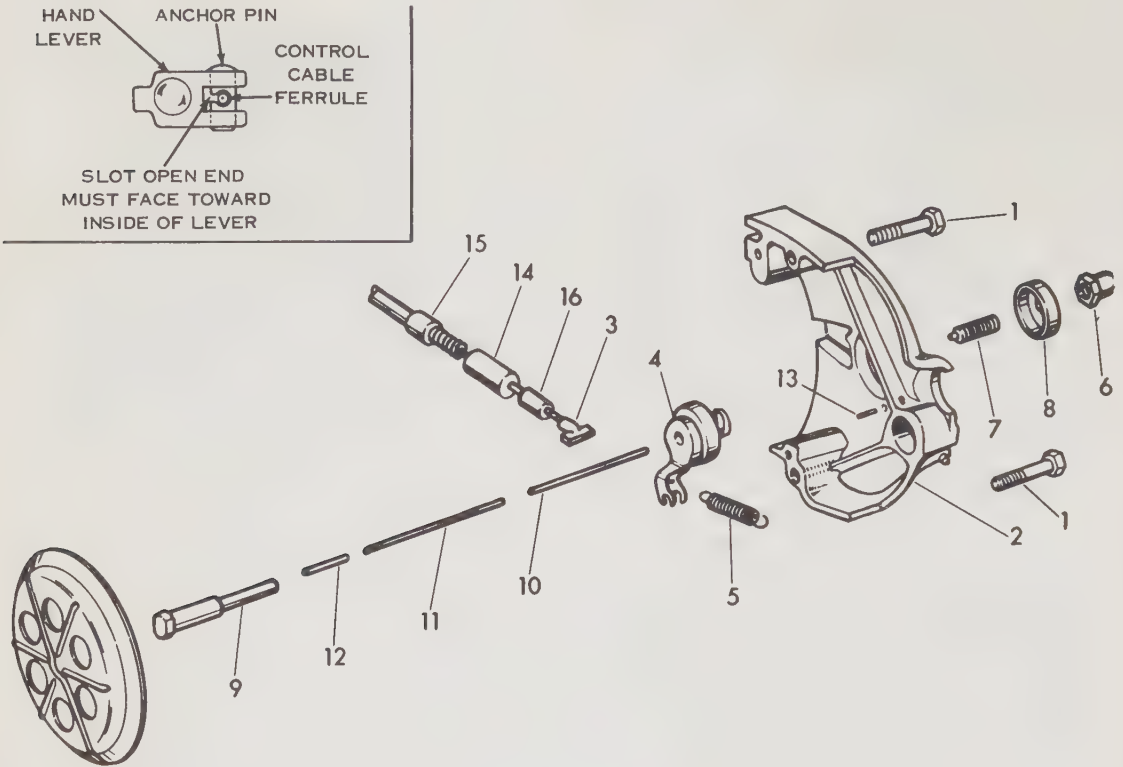
4. Place a drip pan under the chain cover and remove the cover and gasket.

5. Remove the clutch cover screws, retainers, cover, and gasket. Tap the cover gently to remove it, but do not pry on it as this may warp it and cause leaks.

6. Tighten the adjusting nuts, one-half turn at a time, making sure that they seat in their locked position against the adjusting plate after each turn. The nuts have hex-heads of $\frac{7}{16}$ and $\frac{1}{2}$ in. sizes.

7. When properly adjusted the pressure plate should be uniformly $\frac{3}{16}$ in. from the outside of the spring cup flanges.

8. If tightened beyond $\frac{7}{64}$ in. clear-



1970 and earlier clutch release mechanism (Sportster)

- | | | |
|---|-------------------------------------|-------------------------------------|
| 1. Sprocket cover bolts (2) | 7. Clutch adjusting screw | 12. Clutch release rod—left center |
| 2. Sprocket cover | 8. Clutch release worm cover | 13. Sprocket cover roll pin |
| 3. Control cable end | 9. Clutch release rod—left | 14. Clutch cable felt seal retainer |
| 4. Clutch release worm and lever | 10. Clutch release rod—right | 15. Clutch cable ferrule |
| 5. Clutch release worm and lever spring | 11. Clutch release rod—right center | 16. Clutch cable felt seal |
| 6. Clutch adjusting screw locknut | | |

ance, the clutch will not release. The necessity of such an adjustment would indicate worn or oily clutch plates. Excessive tightness will damage the clutch release rods.

1971 AND LATER SPORTSTER CLUTCH RELEASE MECHANISM ADJUSTMENT

1. Remove the access plug of the release mechanism adjusting screw.

2. Adjust the hand lever for free-play before the clutch starts to release by observing the motion of the adjusting screw.

3. If play is present, loosen the adjusting screw locknut and turn the screw inward until increased pressure is felt, then back it out $\frac{1}{4}$ turn. Secure the locknut while holding the screw with a screwdriver.

4. If no play is present, remove the chaincase cover and check to make sure that the three balls return to their bottom

position when the release ramp and lever are released.

5. Loosen the coil adjusting sleeve locknut.

6. Turn the sleeve in until there is no cable slack when the balls are seated in their bottom position.

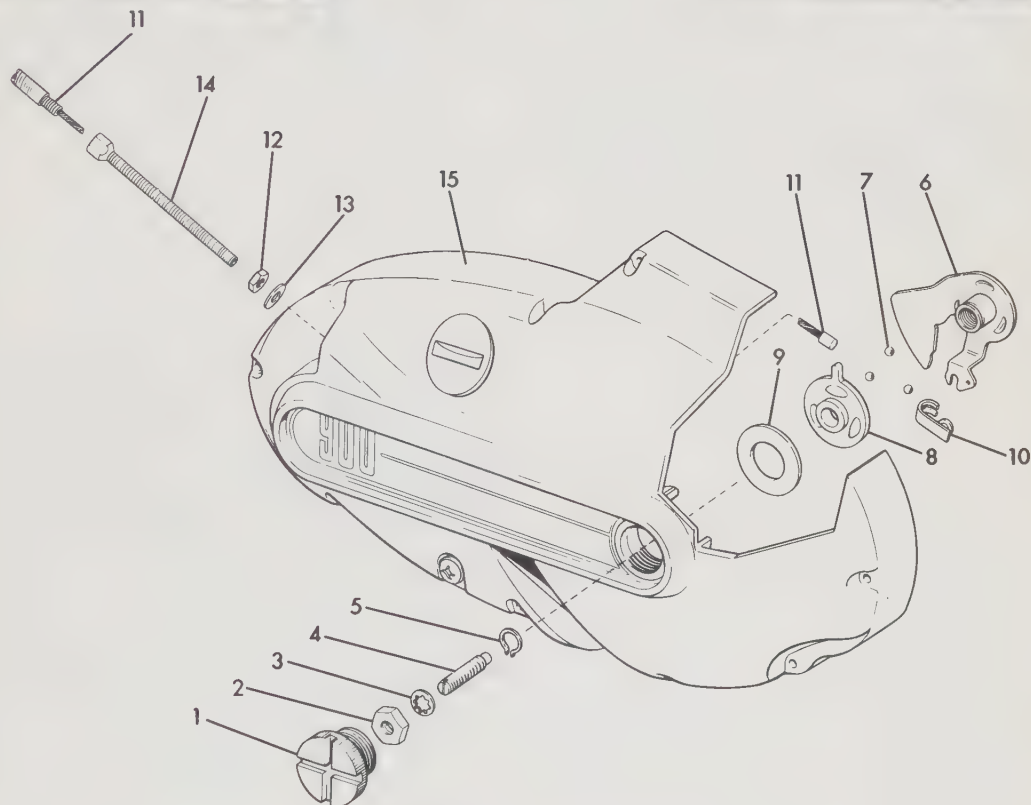
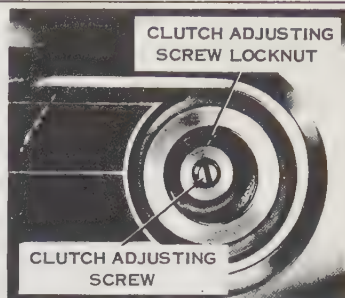
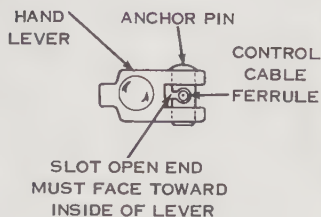
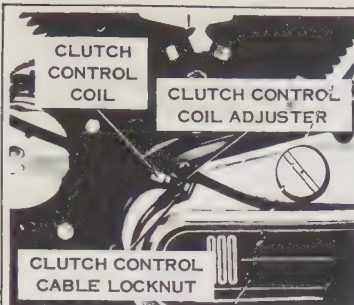
7. Secure the case cover and adjust the release rod screw as previously described.

1971 AND LATER SPORTSTER CLUTCH SPRING ADJUSTMENT

1. This procedure is the same as described in the "Sportster" section.

2. When properly adjusted, the pressure plate should be $\frac{11}{32}$ in. from the outer surface of the outer drive plate.

3. If tightened beyond $\frac{5}{16}$ in. clearance, the clutch will not release. Such an adjustment will damage the clutch release rods.



1971 and later clutch release mechanism

- | | | |
|--|---------------------------|-------------------------------------|
| 1. Access plug, clutch release adjusting screw | 6. Release ramp and lever | 11. Cable and coil assy. |
| 2. Lock nut, adjusting screw | 7. Ball (3) | 12. Lock nut, coil adjusting sleeve |
| 3. Lockwasher, adjusting screw | 8. Release ramp | 13. Washer, coil adjusting sleeve |
| 4. Screw, clutch release adjusting | 9. Washer | 14. Sleeve, coil adjusting |
| 5. Retaining ring, Truarc | 10. Cable coupling | 15. Primary chain case cover |

BRAKE ADJUSTMENT

Adjusting Front Brake Cable (All Models)

1. Loosen the adjusting sleeve locknut.

2. Turn the adjusting sleeve locknut clockwise for less play (free movement) and counterclockwise for more play.

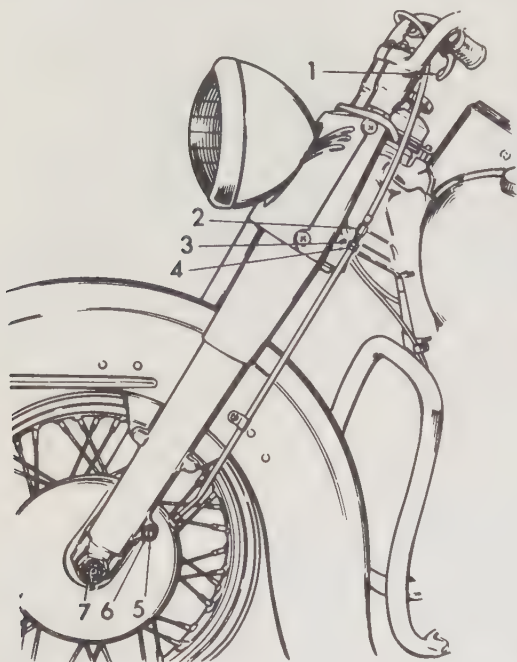
3. When there is about $\frac{3}{16}$ in. cable play, or when $\frac{1}{4}$ of the brake lever's

movement is free, tighten the adjusting sleeve nut. The wheel should be able to spin freely; if it doesn't, the shoes must be centered (adjusted).

Adjusting Front Brake Shoes (All Models)

1. Raise the front wheel so it may rotate freely.

2. Loosen the brake shoe pivot stud nut and sleeve nut. (Substitute "brake



Front brake cable adjustment

1. Front wheel brake hand lever
2. Brake adjusting sleeve
3. Adjusting sleeve locknut
4. Adjusting sleeve nut
5. Brake shoe pivot stud nut
6. Brake shoe pivot stud
7. Axle sleeve nut

shoe pivot stud" for "pivot stud nut" on Sportsters. Loosen this but do not remove it).

3. Spin the wheel and apply the brake. Tighten the pivot stud nut and then the axle sleeve nut.

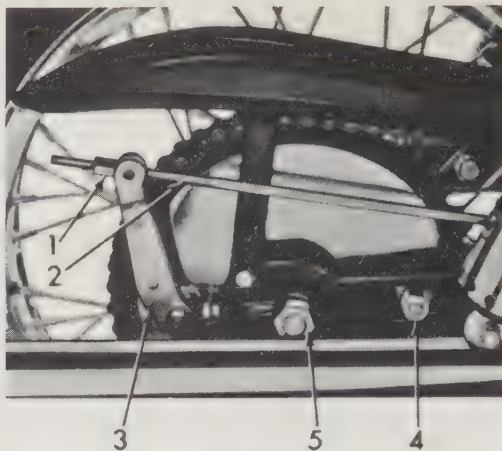
4. Recheck for correct cable adjustment.

Adjusting Rear Wheel Brake Linkage

SPORTSTER AND MECHANICAL BRAKE GLIDE MODELS

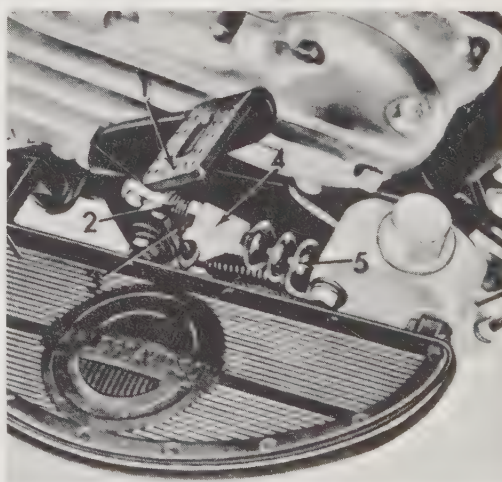
1. Turn the brake rod adjusting nut clockwise to tighten the brake and counterclockwise to loosen it. The nut has a lip which serves as a stop against the clevis pin in the operating lever. Using a screwdriver as a lever against the brake operating lever, pry it forward, and turn the adjusting nut. This saves wear on the nut's lip.

2. There should be $\frac{1}{4}$ in. of play in the brake pedal before the brakes begin to



Sportster rear brake linkage adjustment

1. Brake rod adjusting nut
2. Brake rod
3. Operating lever
4. Brake shoe pivot stud nut
5. Rear wheel axle nut



Glide model hydraulic rear brake linkage adjustment

1. Brake pedal
2. Piston rod
3. Locknut
4. Plunger
5. Rubber boot

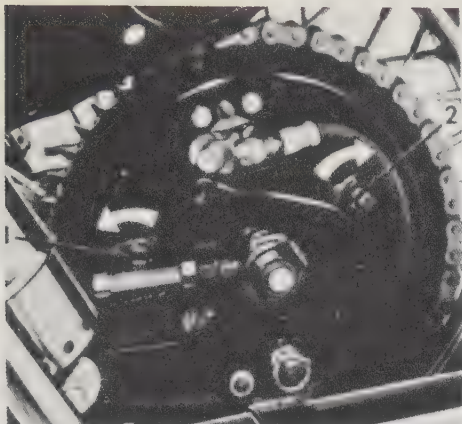
operate. If the brakes still drag, center the shoes.

HYDRAULIC BRAKE (GLIDE MODELS)

1. Expose the piston pushrod link by sliding the rubber boot away from the master cylinder.

2. Adjust the piston rod so that the foot pedal moves freely about $1\frac{1}{2}$ in. before the brake begins to operate.

3. Back off the locknut and turn the



Glide models rear brake shoe adjustment

1. Leading brake shoe adjusting cam nut
2. Trailing brake shoe adjusting cam nut

plunger clockwise to shorten the push-rod, and counterclockwise to lengthen it.

4. Test for free movement and secure the locknut.

Adjusting Rear Brake Shoes

SPORTSTER AND MECHANICAL BRAKE GLIDE MODELS

1. Loosen the brake pivot stud and axle nuts but do not remove stud.
2. Rotate the rear wheel and operate the pedal while the wheel is spinning.
3. Tighten the pivot stud nut and then the axle nut.
4. Recheck for correct pedal adjustment.

Hydraulic Disc Brakes

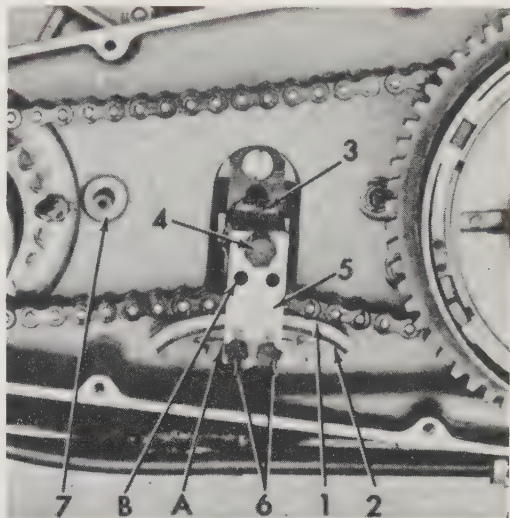
The hydraulic disc brakes are self-adjusting. Fluid levels in front and rear master cylinders should be checked every 1,000 miles.

PRIMARY CHAIN ADJUSTMENT

Check the primary chain every 2,000 miles for correct adjustment. Chain adjustment can be checked through the oil filter opening which is located near the top of the chain housing cover. A properly adjusted chain will have free up-and-down movement in the upper strand as follows:

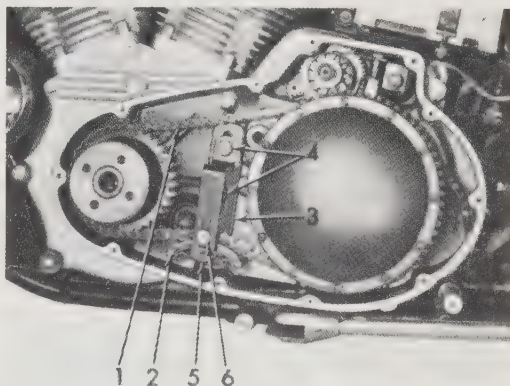
Chain slack with cold engine— $\frac{5}{8}$ to $\frac{7}{8}$ in.

Chain slack with warm engine— $\frac{3}{8}$ to $\frac{5}{8}$ in.



Glide models primary chain adjustment

1. Chain adjusting shoe
2. Chain adjusting shoe bracket
3. Bracket backplate
4. Backplate center bolt
5. Outer plate
6. Support bracket
7. Primary chain oiler
- A. Adjusting holes
- B. Adjusting holes



Sportster primary chain adjustment

1. Drive chain
2. Chain adjuster shoe
3. Support bracket
4. Support bracket bolts (2)
5. Support bracket brace
6. Brace bolt

To adjust the chain, follow the steps below.

1. Disconnect battery cable from starter motor. Remove left foot rest and rear brake foot lever.

2. Place an oil drain pan under clutch. Remove front chain cover screws, chain cover and gasket.

3. Loosen the chain adjusting shoe retaining bolts. Raise shoe to tighten chain and lower to loosen chain.

4. Tighten retaining bolts. Check adjustment of chain.

5. Replace gasket, chain cover and secure with front chain cover screws. Reconnect battery cable to starter motor. Replace foot rest and brake lever.

REAR CHAIN ADJUSTMENT

Check the rear chain adjustment every 1,000 miles. A properly adjusted rear chain will have a ½ in. movement midway between the mainshaft and the rear wheel drive sprocket. Adjustment should be checked at several points along chain. Chain is adjusted as follows:

1972 and Earlier

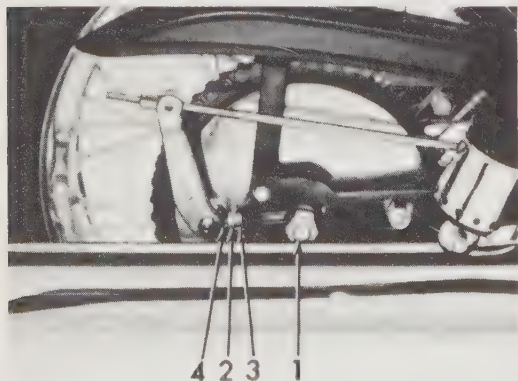
SPORTSTER

1. Loosen the axle nut.
2. Loosen the right and left adjusting stud locknuts.

3. Turn both adjusting stud locknuts clockwise the same number of turns to tighten the chain and counterclockwise to loosen it. While loosening the chain, tap the axle forward with a soft mallet.

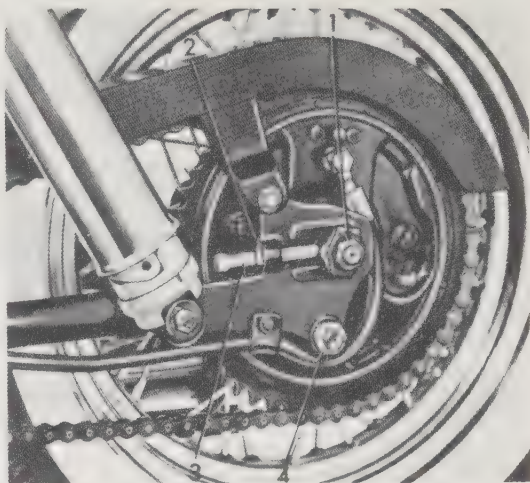
4. Secure the locknut against the adjusting nut and measure the distance from the locknut to the outer end of the adjusting stud. Both should be the same to ensure correct alignment.

5. Spin the wheel and look for wobbling of the sprocket which would indicate poor alignment.



Sportster drive chain adjustment

1. Rear axle nut
2. Adjusting stud locknut
3. Adjusting stud nut
4. Adjusting stud



Glide models rear chain adjustment (pre-1973)

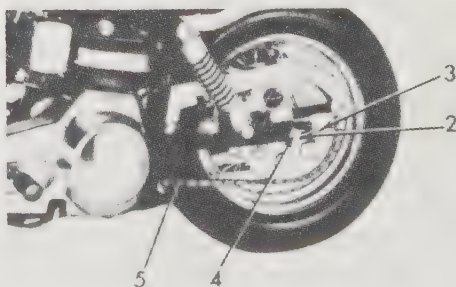
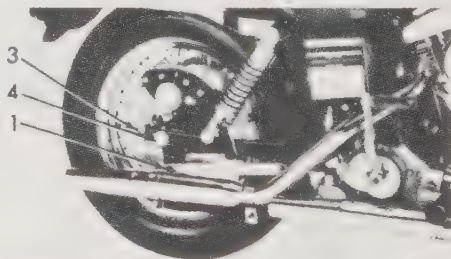
1. Brake sleeve nut
2. Wheel adjusting screw locknut
3. Wheel adjusting screw
4. Brake anchor stud nut

6. The chain should have ½ in. of play midway between the mainshaft and the rear wheel sprocket.

7. Secure the axle nut and adjusting stud locknut. Adjust the brake rod if necessary.

GLIDE MODELS

1. Remove the axle nut and washer from right-side and loosen the brake



Glide models rear chain adjustment (1973 and later)

1. Brake anchor nut and cotter pin
2. Axle nut
3. Axle adjusting nuts
4. Rear axle

sleeve nut, brake anchor stud nut (left-side), and adjusting screw locknuts.

2. Proceed as described in the "Sportster" section.

1973 and Later With Rear Disc Brakes

1. Remove cotter pin and loosen brake anchor cable nut. Loosen axle nut.

2. Adjust chain by turning adjusting nuts. Turn adjusting nuts an equal number of turns to keep wheel in alignment. To move axle forward it may be necessary to tap lightly on the ends of studs.

3. Tighten axle nuts and brake anchor cable nut, replace cotter pin. Check chain adjustment.

Battery

SERVICE

The battery is the source of all spark for starting, operating accessories without the engine running, and for providing necessary current when a sufficient amount is not being generated.

The battery level should be checked regularly because an insufficient amount of fluid can cause voltage loss. In hot weather, the battery demands more attention and it should be checked twice weekly. Fill the battery with distilled or "soft" water only. Never overfill it, as this may cause spillage which will damage paint, chrome, and wiring, and may dilute the electrolyte.

Corrosion on the battery terminals may cause a poor connection or may rot the wires. Clean it off with a solution of baking soda, taking care not to allow any of the solution to enter the filler cap vents. After the action of the solution ceases, wash off the residue with clean water and apply petroleum jelly to the terminals before installation. Check the rubber washers under the caps for rot or swelling as this will cause leakage.

Always charge a battery before storage and store in a cool, dry place. Extended storage is detrimental, so a monthly charge should be performed.

CHARGING

Check to make sure that the electrolyte level just covers the tops of the plates to avoid bubbling over during charging. Use a hydrometer to check the state of charge before and after charging. A reading of 1.270 or higher indicates full strength, and a reading of 1.200 or less indicates a discharged state.

Do not use an automotive charger as the heat produced will cause irreparable damage. If the temperature exceeds 110 degrees Fahrenheit, allow the battery to cool or reduce the charge rate before continuing. A trickle charger of about 2 amps is best since this charges slowly and extends battery life. A fast charge will never result in maximum power. It also tends to fade quickly.

If the battery has become sulphated due to storage, it can be saved by charging at half the normal rate and twice the normal time usually recommended. Weak acid is indicated when the hydrometer reading—after a charge—fails to increase during three successive readings which have been taken at hourly intervals. Leaving a battery in a discharged state will cause its life to shorten considerably.

CAUTION: *When charging, hydrogen gas is formed which will explode on contact with an open flame or an electrical spark. Be careful.*

CHARGING RATE

12 volt 53 ampere hour battery—

10 amperes

12 volt 32 ampere hour battery—

4 amperes

6 volt 51 ampere hour battery—

3½ amperes

6 volt 22 ampere hour battery—

1½ amperes

6 volt 10 ampere hour battery—

½ ampere

2-6 volt 8 ampere hour batteries

(Series connected—12 volts)—½ ampere

Tires

The following information is based on rider and passenger weights of about 150

lbs. Increase front tire pressure 1 lb, and rear tire 2 lbs per 50 lbs of weight increase. Proper tire pressure will provide maximum road adhesion and will increase tire life. Pressure may be increased by several lbs over the required pressure if constant, heavy-load touring is to be done.

Storage Procedures

SHORT-TERM STORAGE

1. Wash the bike thoroughly and ride it until normal operating temperature is reached and all water is evaporated.

2. Drain the engine transmission oil, clean the oil filter, and replace the oil.

3. Run the engine long enough to circulate the fresh oil.

4. Fill the fuel tank with gasoline, unless the machine is to be stored in a closed area.

5. Remove the spark plugs and squirt some engine oil into the plug holes. Turn the engine over several times to distribute the oil onto the cylinder walls. Cover the plug holes with pieces of clean rag.

6. Drain the carburetor float bowl (if applicable) and replace the air cleaner element.

7. Check the battery electrolyte level. Charge the battery if necessary. Disconnect the positive lead, clean the

Recommended Tire Pressures

	Front Tire Size	Front Tire Pressure	Rear Tire Size	Rear Tire Pressure
SPORTSTER				
1966 and earlier XL, XLH	3.25/3.50 x 19	14 lbs	4.00 x 18	18 lbs
1967 and later XL, XLH	3.50 x 18	14 lbs	3.50 x 18	18 lbs
1969 and earlier XLCH	3.25/3.50 x 19	16 lbs	4.00 x 18	18 lbs
1970 and later (all models)	3.75 x 19	18 lbs	4.25 x 18	30 lbs
GLIDE MODELS				
Solo	5.10 x 16	20 lbs	5.10 x 16	24 lbs
	5.00 x 16	12 lbs	5.10 x 16	18 lbs
	3.75 x 19	18 lbs	5.10 x 16	24 lbs
Rider and one passenger	5.10 x 16	20 lbs	5.10 x 16	26 lbs
	3.00 x 16	12 lbs	5.10 x 16	20 lbs
	3.75 x 19	18 lbs	5.10 x 16	26 lbs
Rider, one sidecar passenger or 150 lb load	5.10 x 16	22 lbs	5.10 x 16	26 lbs
	5.00 x 16	12 lbs	5.00 x 16	20 lbs
Sidecar wheel	5.10 x 16	20 lbs		
	5.00 x 16	14 lbs		

battery surface thoroughly, and coat the terminals with petroleum jelly.

8. Lubricate all points on the machine thoroughly.

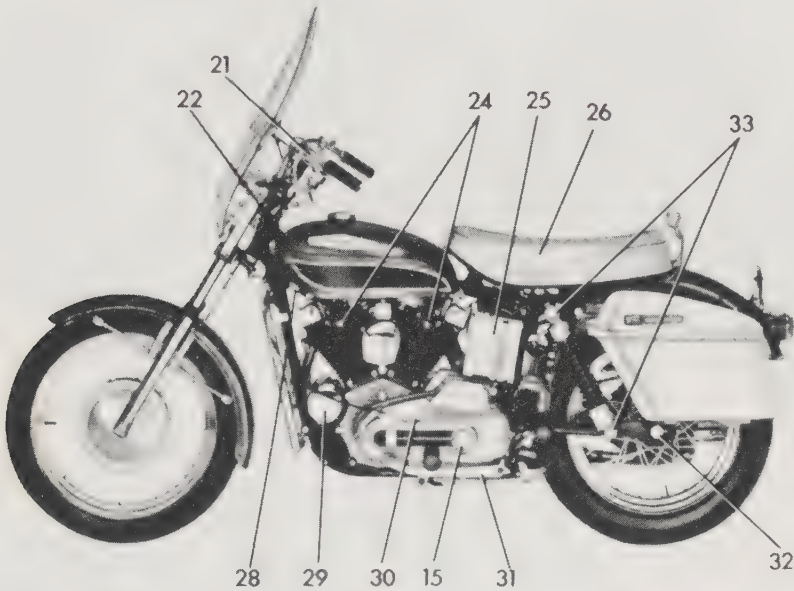
9. Heavily wax and polish all metal surfaces, especially the chrome. If the wax is the type that can be polished when dry, it may be left on during storage.

10. Place the bike on its center stand (if applicable) or block it upright. Allow-

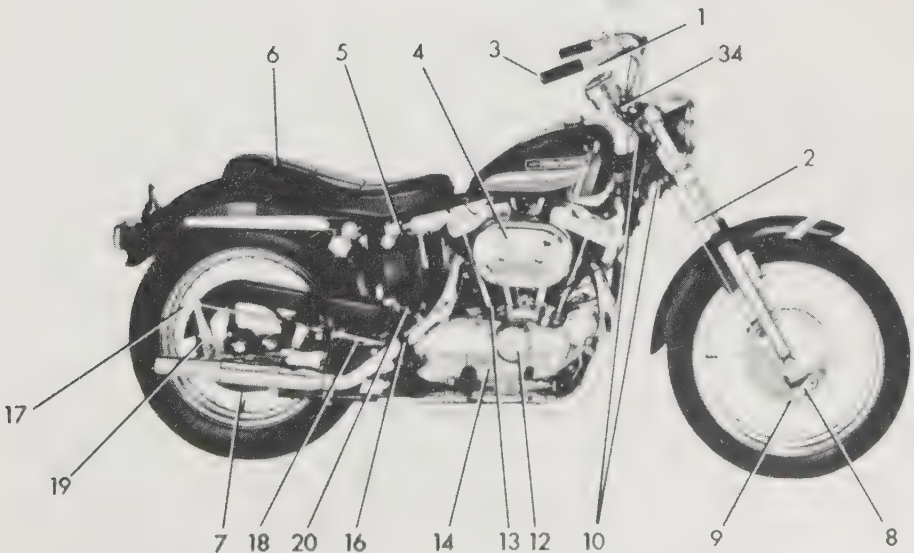
ing the machine to lean to its right may cause oil damage to the clutch.

11. Cover the bike with a porous material (i.e., an old blanket) to help fight condensation. If the bike is to be stored outside, it may be covered with a non-porous material, but should be uncovered and wiped down periodically to prevent rust.

12. To remove the machine from storage, clean off any dust or polish,



Sportster service points



Sportster service points

check over all of the maintenance points, and set the timing and carburetor if necessary.

LONG-TERM STORAGE

For periods in excess of two months, perform all of the above steps and also:

1. Disconnect the fuel lines and drain off all but about one quart of gasoline.

2. Pour one-half cup of oil into the tank and coat the walls of the tank by rocking the machine back and forth.

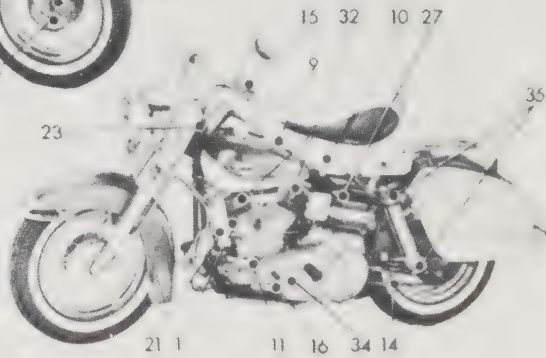
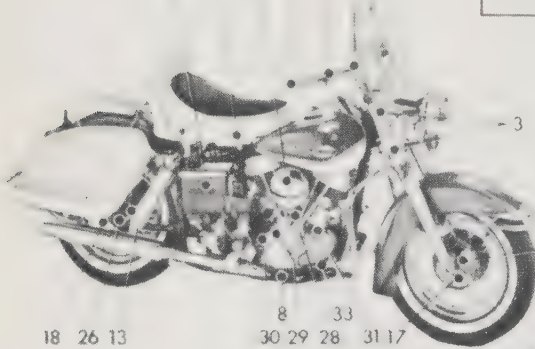
3. Seal the fuel line and petcock openings but do not connect the two.

4. Remove and fully charge the battery, and store it in a cool, dry place. Recharge the battery every two months.

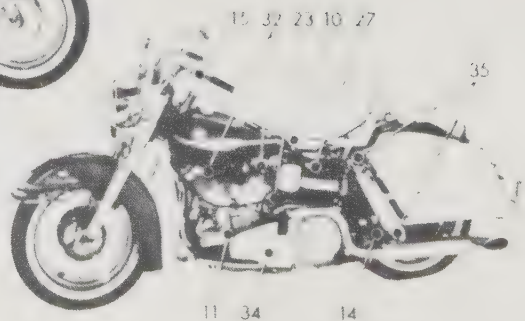
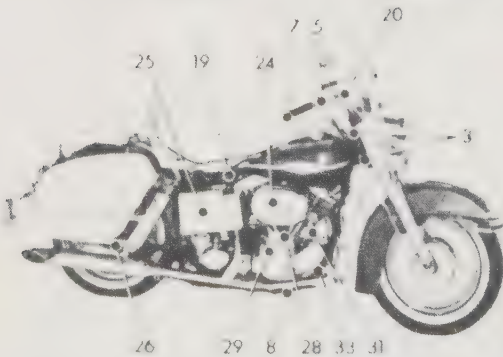
5. Drain the gas tank thoroughly and flush it out before trying to start the bike.

25 19 24 7 5 20

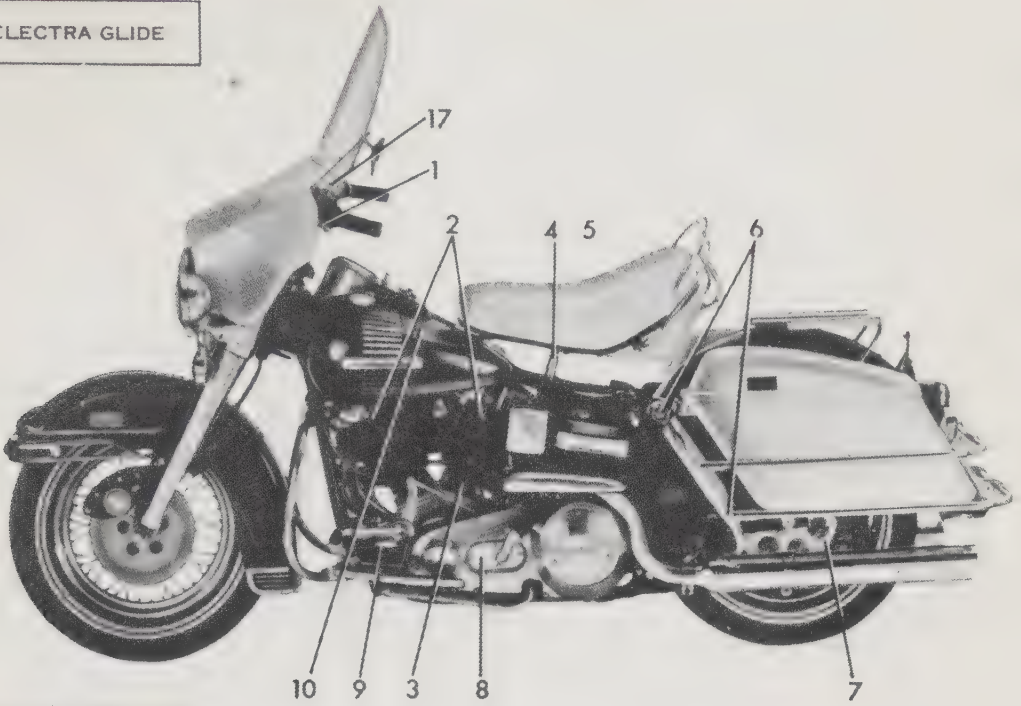
1965-67 Models



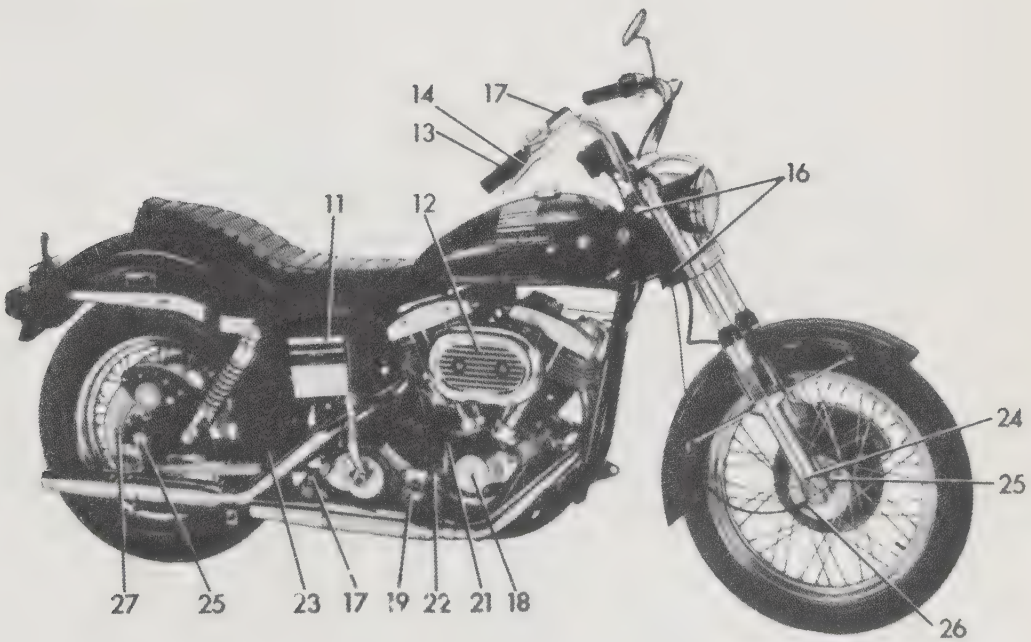
1968-69 Models



ELECTRA GLIDE

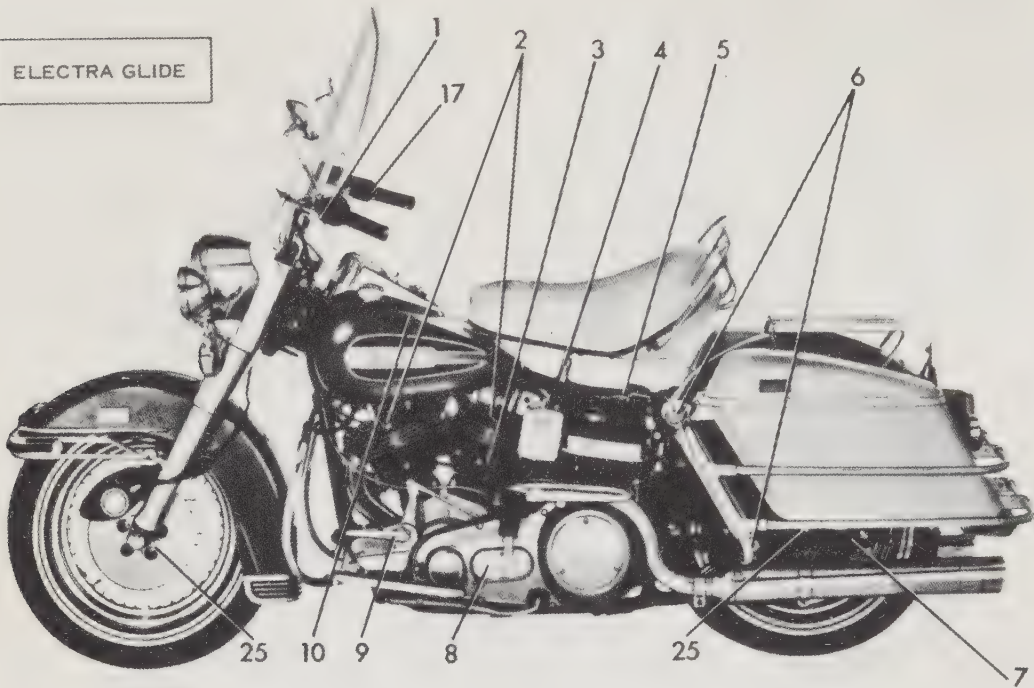


SUPER GLIDE

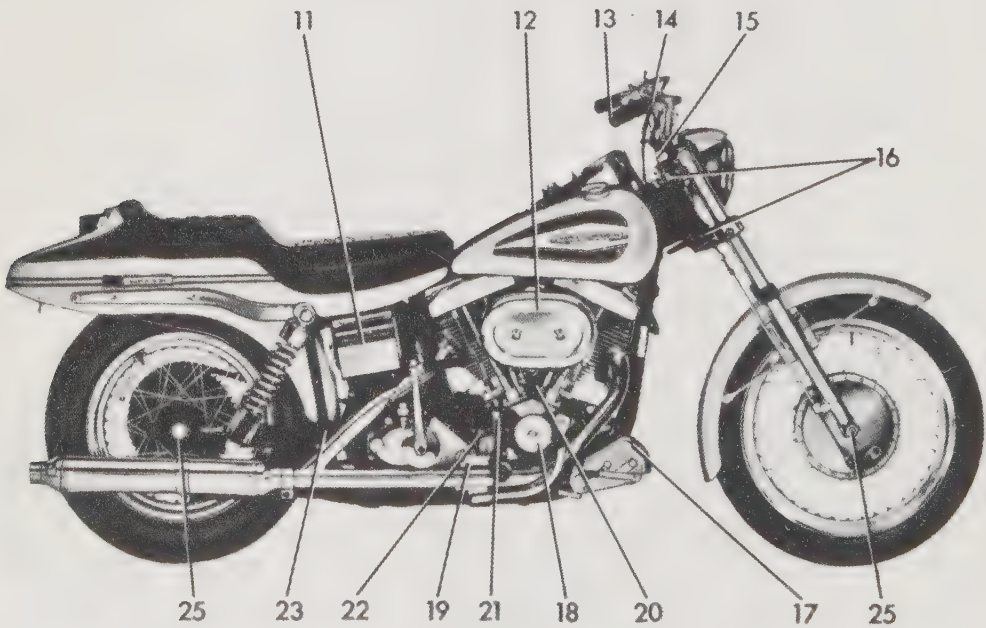


1973 and later Glide models service points

ELECTRA GLIDE



SUPER GLIDE



1972 Glide models service points

Periodic Maintenance Intervals

Interval	Service	Sportster ^①	Glide Models ^①
WEEKLY	Check battery level	25	25, 11
	Check tire pressure		
	Adjust chain	7	26, 27
	Adjust clutch		
	Adjust brakes		
	Check brake fluid		33, 17
	Tighten nuts, bolts, and wheel spokes		
EVERY 1,000 MILES OR 2 MONTHS (SUMMER) OR 1 MONTH (WINTER)	Clean air cleaner	4	24, 12
	Change engine oil (during winter or dusty conditions)		
	Check transmission oil		
	Check rear chain oiler	20	22
EVERY 2,000 MILES OR 4 MONTHS (SUMMER) OR 2 MONTHS (WINTER)	Adjust tappets	13	
	Clean and adjust contact points	12	31, 18
	Adjust primary chain	30	34, 8
	Clean tappet oil screen		29, 21
	Change engine oil		
	Change fuel filter		28, 20
	Check primary chain oiler		30, 22
EVERY 5,000 MILES OR 12 MONTHS	Adjust ignition timing	12	31, 18
	Replace spark plugs	24	32, 2
	Replace oil filter element	5	27, 5
	Replace contact points	12	31, 18
	Replace air filter element		

Periodic Maintenance Intervals (cont.)

<i>Interval</i>	<i>Service</i>	<i>Sportster</i> ①	<i>Glide Models</i> ①
EVERY 5,000 MILES OR 12 MONTHS	Change transmission oil		
	Change fork oil		24(FX)
	Check generator	29	4
	Check alternator		
	Check shock bushings	33	35, 6
	Check front and swing arm bearings	10	16-23
	Rotate tires		
EVERY 10,000 MILES	Check oil pressure		

Periodic Maintenance Intervals

<i>Interval</i>	<i>Grease</i>	<i>Sportster</i>	<i>Glide Models</i> ①
EVERY 2,000 MILES	Front brake shaft	8	
	Front wheel hub		17, 25
	Rear brake shaft	19	
	Rear brake crossover shaft	31	
	Rear wheel hub	32	18, 25
	Swing arm pivot bearing		22A, 23
	Body frame bearing		
	Clutch release worm	15	
	Clutch release cable housing		
	Clutch pushrod bearing		
	Clutch booster bearing		1
	Clutch pedal bearing		
	Foot shift lever	14	11, 9
	Rear brake pedal bearing		8, 19
	Kick-starter shaft	16	

Periodic Maintenance Intervals (cont.)

Interval	Grease	Sportster ^①	Glide Models ^①
EVERY 2,000 MILES	Master cylinder lever		
	Rear axle bearing		
	Saddle bearing and post	6	9–10, 4–10
	Tachometer drive gear		
	Speedometer drive		26(FX)
EVERY 5,000 MILES	Throttle control spiral	3	7, 13
	Spark control spiral	23	6
	Speedometer cable	34	
	Tachometer cable	34	
	Contact breaker camshaft and advance unit	12	31, 18
	Compensating sprocket		16
	Sidocar wheel hub		
	Generator bearing	29	4
	Front wheel hub	27	2, 25
	Rear wheel hub		13, 25
EVERY 10,000 MILES	Repack rear fork pivot bearing	18	22
EVERY 50,000 MILES	Repack steering head bearings	10	3

Periodic Maintenance Intervals

Interval	Oil	Sportster	Glide Models ^①
WEEKLY	Rear chain	10	14
EVERY 2,000 MILES	Clutch hand lever	21	15, 1
	Brake hand lever	1	5, 20
	Clutch control cable	22	23, 3

Periodic Maintenance Intervals (cont.)

Interval	Oil	Sportster ^①	Glide Models ^①
EVERY 2,000 MILES	Front brake cable	2	20, 15
	Throttle cable	28	7, 13
	Spark cable	11	12
	Clutch booster lever rod clevis		21
	Shifter lever linkage		
	Rear brake rod clevis	17	
	Front brake cable clevis	9	
	Saddle post bearing	26	19, 4
	Generator bearing	29	4

① These numbers correspond to the periodic maintenance illustrations.

Capacities

Sportster	XL, XLH	XLCH
Fuel Tank (U.S. gal)	4.0	2.2
Oil Tank (quarts)	3	3
Transmission (pints)	1½	1½
Front Forks (oz)	6½	6½
Glide Models	FL, FLH	FX
Fuel Tank (large) (U.S. gal)	5.0	3.6
(small) (U.S. gal)	3.5	—
Reserve Tank (large) (U.S. gal)	1.2	0.7
(small) (U.S. gal)	1.0	—
Oil Tank (quarts)	4	4
Transmission (pints)	1½	1½
Front Forks (oz)	6½	6½

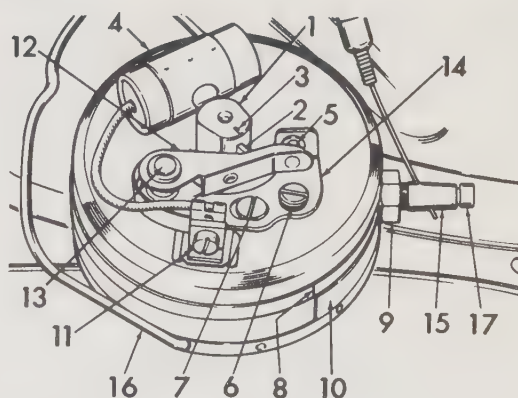
3 · Tune-Up

Contact Breaker Points

There are four types of contact breakers in use on all Harley-Davidson V-Twins. In working with all four, remember to maintain the points in good condition by keeping them free of oil and dirt, and by ensuring a good contact. By this we mean that the points should be filed so there are no high or low areas, and so that any pitting of the surfaces are removed. This should be done with either a special point file or a fine emery cloth. The points should be checked for gap and surface condition at the first 500 and 1,000 miles, and every 2,000 miles thereafter.

SINGLE CONTACT BREAKER WITH MANUAL ADVANCE

This system has one pair of points which regulate the spark in both cylinders simultaneously. The narrow lobe of the cam times the front cylinder and the wide lobe times the rear cylinder. Both cylinders operate from a single ignition coil which fires both spark plugs, but at different stages of the combustion cycle. If the front cylinder is firing, the rear is dormant, since no combustible mixture is present during the exhaust stroke. Manual rotation of the circuit breaker base provides advanced or retarded timing.

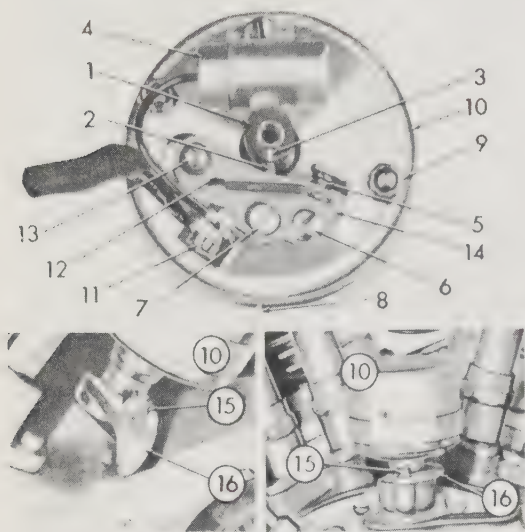


Single contact breaker, manual advance

- | | |
|------------------------------|---------------------------------|
| 1. Breaker cam | 10. Timing adjusting stud plate |
| 2. Fiber cam follower | 11. Wire stud screw |
| 3. Cam timing mark | 12. Circuit breaker lever |
| 4. Condenser | 13. Pivot stud |
| 5. Contact points | 14. Contact point and support |
| 6. Lock screw | 15. Timing adjusting stud |
| 7. Eccentric adjusting screw | 16. Cover retainer |
| 8. Timing mark | 17. Control wire lock screw |
| 9. Adjusting stud locknut | |

Adjustment

1. Loosen the point lock screw.
2. Rotate the eccentric adjusting screw until the points open far enough to insert a feeler gauge of 0.020 in.
3. Secure the lock screw and check gap against any movement which may have occurred when securing the screw.



Single contact breaker, automatic advance

1. Breaker cam
2. Fiber cam follower
3. Cam timing mark
4. Condenser
5. Contact points
6. Adjustable point lock screw
7. Eccentric adjusting screw
8. Timing marks (1965) model
9. Circuit breaker head nut (2)
10. Circuit breaker head
11. Wire stud screw
12. Circuit breaker lever
13. Pivot stud
14. Contact point and support
15. Stem clamp nut
16. Stem clamp

SINGLE CONTACT BREAKER WITH AUTOMATIC ADVANCE

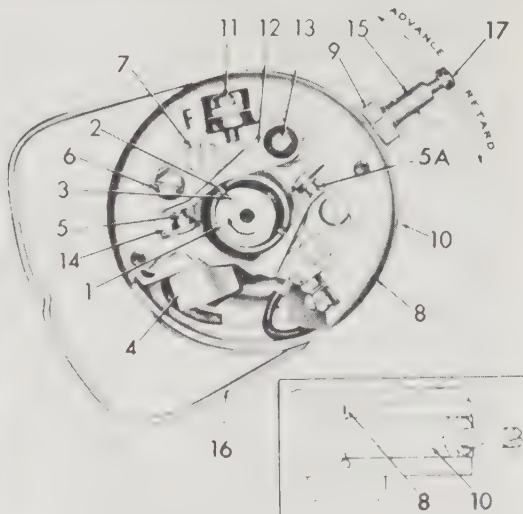
This type of contact breaker works the same way as the manual advance type, except that the spark is automatically advanced through the action of flyweights in the contact breaker base as the engine speed increases.

Adjustment

The points on the automatic advance type are set in the same manner as on the manual advance type.

DOUBLE CONTACT BREAKER

This system has individual contact point sets and coils for each cylinder. The single lobe cam on the timer shaft has a single mark which aligns with the fiber cam follower for each set of points when the points are open to their fullest travel. Therefore, the cam opens each set of points once every crankshaft rotation.



Double contact breaker

- | | |
|----------------------------------|-------------------------------|
| 1. Cam | 9. Adjusting stud locknut |
| 2. Fiber cam follower | 10. Timing adjusting plate |
| 3. Cam timing mark | 11. Wire stud screw |
| 4. Condenser | 12. Circuit breaker lever |
| 5. Front cylinder contact points | 13. Pivot stud |
| 5A. Rear cylinder contact points | 14. Contact point and support |
| 6. Lockscrew | 15. Timing adjusting stud |
| 7. Adjusting screw | 16. Cover retainer |
| 8. Timing mark | 17. Control wire lockscrew |

Adjustment

1. Loosen the front cylinder (indicated by an "F" on the breaker base) breaker point lock screw.

2. Set the front points to 0.022 in. by manipulating the eccentric adjusting screw until the proper gap is obtained. Check the gap with a wire feeler gauge. There should be a slight drag on the gauge when removing it.

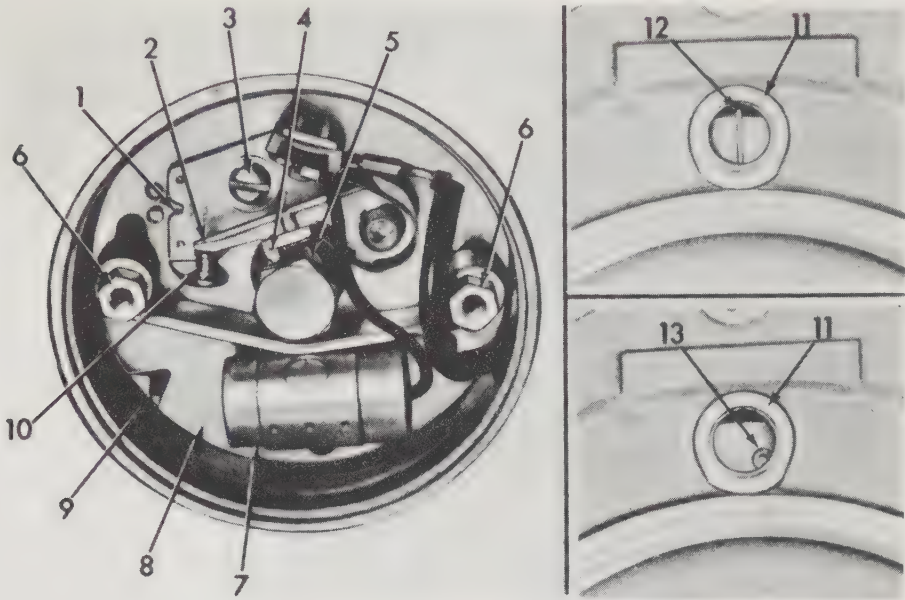
3. Secure the lock screw and check gap against possible movement caused by securing the lock screw.

4. Follow the above procedure on the rear set of points.

5. Check ignition timing any time the rear set of points are adjusted as this will affect the timing. Consult "Ignition Timing" section for procedures.

1971 AND LATER CONTACT BREAKER

This type of circuit breaker is the same as the "Single Contact Breaker With Automatic Advance." If, during point gap setting procedures, a discrepancy of 0.004 in. or more is discovered, the



1971 and later contact breaker

- | | |
|---------------------------------------|--|
| 1. Contact point adjusting notch | 8. Circuit breaker plate |
| 2. Moving contact points | 9. Circuit breaker plate adjusting notch |
| 3. Stationary contact point lockscREW | 10. Contacts |
| 4. Cam follower | 11. Timing inspection hole |
| 5. Breaker cam | 12. Advance (35°) timing mark on flywheel |
| 6. Circuit breaker plate screws (2) | 13. Retarded (5° BTDC) position of piston top dead center mark on flywheel |
| 7. Condenser | |

breaker cam must be checked for eccentric travel. Consult "Electrical Systems" chapter.

Adjustment

1. Loosen the point lock screw.
2. Rotate the eccentric adjusting screw until a gap of 0.018 in. is obtained.
3. Secure the lock screw and check for movement caused by securing the lock screw.

Ignition Timing

For ease in rotating the engine, remove the spark plugs and block up the motorcycle so the rear wheel will turn freely. By placing the machine in high gear and turning the rear wheel, the engine can be rotated forward to open or close the points. Always rotate the engine in its direction of normal operation, except for

slight movements backward to flicker the timing light.

Telescoping the front pushrod cover will allow the valve motion to be observed. When the valve adjusting mechanism comes all the way up, the valve is closed. The piston comes up for the compression stroke just after the front intake valve closes.

Remove the crankcase view plug and replace it with a Timing Mark View Plug (H-D Part No. 96295-65). This is absolutely necessary if a strobe-light is to be used, otherwise oil will be thrown through the view plug port.

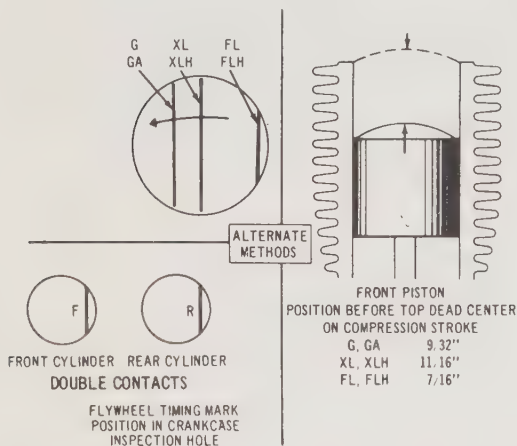
If a simple test light (a 12-volt bulb and two leads) is used, attach one lead to the point contact wire stud screw and ground the other on the engine or frame. The ignition must be turned on when setting the timing. This type of light will go on when the points open.

If a test light with a self-contained power source (a small dry cell battery) is used, connect it as above. The ignition of

the motorcycle is left off. This type of light will go off when the points open.

If a strobe light is to be used, connect it according to the manufacturer's instructions.

If no test lamp is available, a piece of cellophane can be used as a temporary measure. Place the cellophane between the points—while they are closed—and rotate the engine while gently tugging on the cellophane. When the cellophane is released, the points are open. This must be performed with the contact breaker set in the advanced position.



Timing marks for all models with manual advance contact breakers

STATIC TIMING

Manual Advance Single Contact Breaker

1. Rotate the engine slightly less than one-half revolution past the compression stroke until the front cylinder flywheel timing mark is centered in the view port in the left crankcase.

2. Check to make sure that the contact breaker base timing mark aligns with the timing adjusting plate mark.

3. Rotate the contact breaker head counterclockwise against its stop by turning the left handlebar grip forward. This is the fully advanced position.

4. Check to see that the cam lobe timing mark is aligned with the fiber cam follower. Loosen the adjusting stud locknut and shift the breaker head until alignment is obtained. Secure the locknut. The breaker base timing mark will no

longer be aligned with the timing adjusting plate.

5. With the contact breaker base in its fully advanced position and a timing light hooked up, rotate the engine until the lamp goes out and the flywheel timing mark is in position.

6. Rotate the engine backward slightly, with the spark retarded, to see if the light comes back on.

7. If the light stays on, the timing is retarded and must be adjusted by loosening the adjusting stud locknut and rotating the breaker base counterclockwise until the light flickers or goes off in the fully advanced position.

8. If the light goes off before the fully advanced position is reached, the timing is advanced and must be adjusted by loosening the adjusting stud locknut and rotating the breaker base clockwise until the light flickers or goes off in the fully advanced position.

9. Secure the locknut and shift the breaker head from the retard to the advance position to see if the points begin to open when the breaker cam reaches the advance stop. The flywheel must be positioned correctly during the entire operation.

10. It is not necessary to time the rear cylinder as this operation times both.

Manual Advance, Double Contact Breaker

1. Time the front cylinder (marked "F" on the breaker base) in the same manner as for a single contact breaker, manual advance unit. There is an "F" marked on the flywheel for the front cylinder.

2. The rear cylinder is timed in the same manner except that the flywheel mark will be "R" instead of "F," and the test lamp must be attached to the coil for the rear cylinder.

3. If the contact points remain closed in the fully advanced position, the timing is late and the points should be set slightly further apart.

4. If the contact points begin to open before the cam is in the advanced position, the timing is early and the points should be set closer together. These adjustments will result in a setting different from the original 0.022 in.

5. A spark timing gauge (H-D Part No.

95885-61), which screws into the spark plug hole, can be used to indicate piston position. If such a gauge is unavailable, top dead center can be found by inserting a screwdriver into the spark plug hole and rotating the engine until the highest point of the piston travel is located. By observing valve movement, the compression stroke can be determined.

Automatic Advance Contact Breakers

The main difference in adjusting this type of contact breaker is that there is no adjusting screw for advancing the timing. Timing is advanced by a set of flyweights on the cam and therefore the cam must be turned clockwise until the flyweights rest against their stops. This advanced position must be maintained while checking and adjusting the timing. Remember that the cam engages the flyweights on the camshaft in two positions which are 180 degrees apart. Only one of these positions will provide correct timing.

1. Prepare the machine for timing as for the manual advance contact breakers, rotating the engine until the flywheel timing mark is properly aligned in the inspection hole and the cam mark aligns with the cam follower.

2. The cam must be turned clockwise, with the flyweights against their stops, and held in this position during the timing procedure.

3. If the cam follower and the cam timing mark do not align, the contact breaker head must be shifted until alignment is obtained in the following manner:

a. A limited adjustment is available on 1965 models due to slotted holes in the timer plate in which the base studs ride. Loosen the contact breaker head nuts and shift the base by prying between the plate lip and the base stud with a screwdriver.

b. If this is not enough, the entire shaft must be loosened, lifted free, and rotated a couple of teeth until the follower and the cam mark are in alignment. This will cause the base timing marks to go out of alignment.

c. When the cam and fiber align, while in the fully advanced position, secure the timer plate nuts. Over-tightening will cause distortion of the timer base plate and affect timing.

d. On 1966 and later models, there is a clamp on the contact breaker base which allows for adjustment over a 360 degree arc.

e. Loosen the clamp nut or bolts, and shift the head until the cam and fiber are aligned. Shifting the head clockwise will retard the spark and counterclockwise will advance it.

4. The ignition is timed in the same manner as on manual-advance type contact breakers. Since there is a certain amount of end-play in the contact breaker drive-gear, the timing will always be slightly retarded. To arrive at a truly accurate setting, a strobe light should be used with the engine running since end-play is taken up with the engine in operation.

SPORTSTER H



ADVANCE
FRONT PISTON 11/16"
(45°) BEFORE TOP
DEAD CENTER

DUO-GLIDE
ELECTRA-GLIDE



ADVANCE
FRONT PISTON
7/16" (35°) BEFORE
TOP DEAD CENTER

Timing mark positions for all models with automatic advance contact breakers

1971 and Later Case-Mounted Contact Breakers

1. Timing procedures are the same as for automatic advance contact breakers.

2. Timing is set by the flywheel mark rather than the cam mark on the 1970 and earlier models. Loosen the breaker base screws and shift the plate by prying at the breaker plate adjusting notch with a screwdriver until the contacts open when the flywheel mark is aligned in the inspection hole.

DYNAMIC TIMING**(Timing With a Strobe Light)**

1. Install the view plug in the crank-case view port.

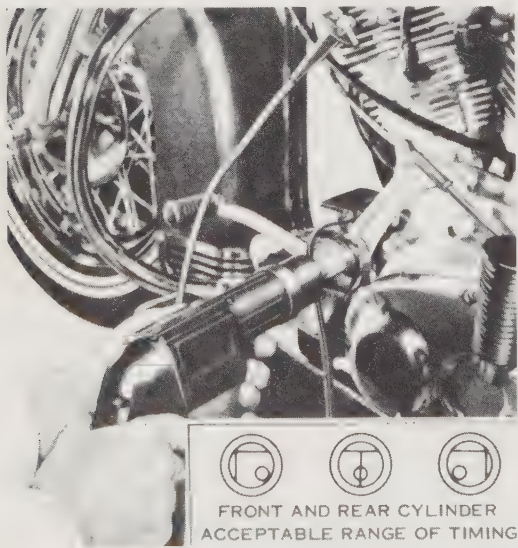
2. Connect the strobe leads to the front cylinder spark plug, ground, and the red lead to either a battery terminal or the point hot lead. Consult the light manufacturer's instructions for further information.

3. Run the engine at normal operating temperature at 2,000 rpm.

4. Aim the light into the view port.

5. Adjust the breaker as in the previous sections until the timing marks are lined up properly in the port. The 1971 and later models have a single dot to indicate the rear cylinder which should appear on or near the mark for the front cylinder while viewed under the timing light.

NOTE: For points replacement refer to "Contact Breaker" section in "Electrical Systems."



Timing with a strobe light

Sportster XLCH Magneto

The magneto is a generating system composed of a rotor, an induction coil with primary and secondary circuits, a condenser, a contact breaker cam, and contact breaker points. High-voltage discharge is produced and directed to each

spark plug twice in a 360 degree cycle, because the magnetic field must be collapsed twice so each plug will fire on its given power stroke. The magneto is shut off by a grounding circuit controlled by a "kill" button.

The 1965 and later models have a mobile mounting plate which allows the spark to be retarded for easier starting. This adjustment is made by a twist-grip on the left-side of the handlebar.

ADJUSTING CONTACT BREAKER POINTS

1. The points should be examined for proper gap and surface 1,500 miles after installation and then at intervals of 2,000 miles.

2. Remove the carburetor, air cleaner, and magneto cover.

3. Remove the plugs and place the transmission in High gear. The engine may be rotated by setting the machine on the center stand and turning the rear wheel.

4. Rotate the engine in its normal running direction until the cam follower is on either high point of the cam.

5. Clean the points with either a point file or fine metal sandpaper before setting, and blow clean. When in doubt about point condition, it is best to replace them.

6. Check the gap with a feeler gauge. (0.015 in.).

7. Adjust the points by loosening the pivot and adjustment screws and re-checking them.

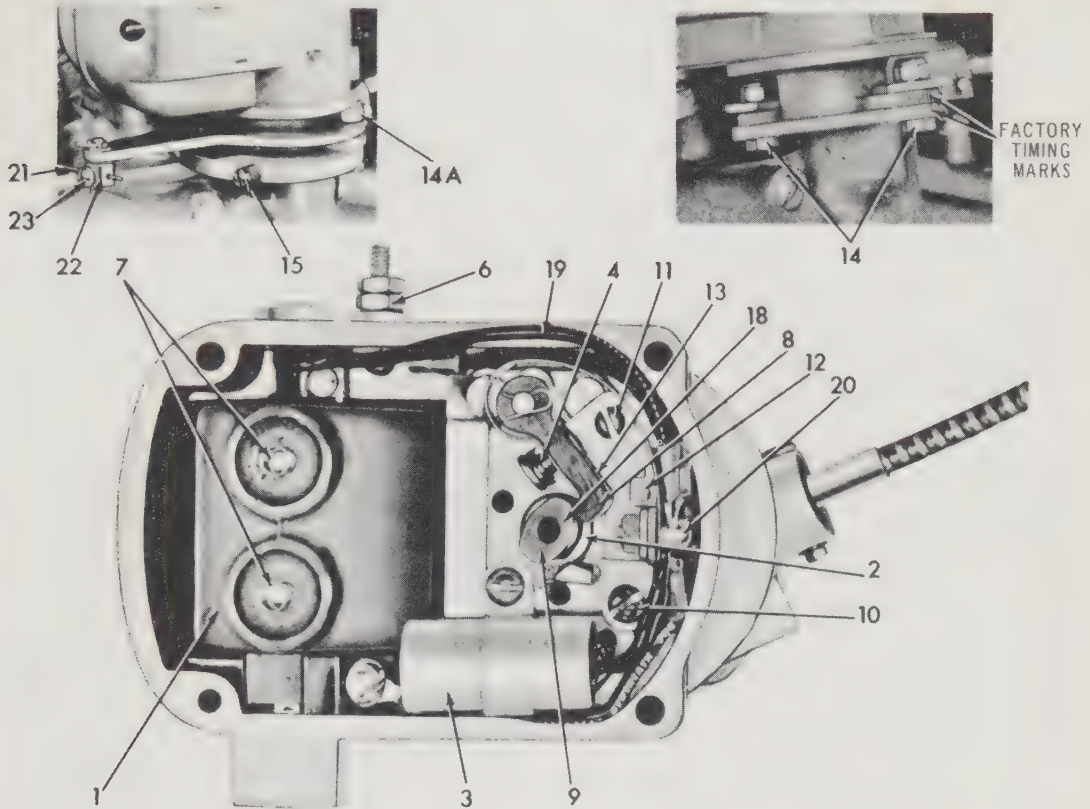
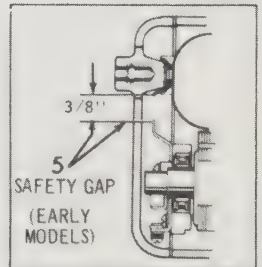
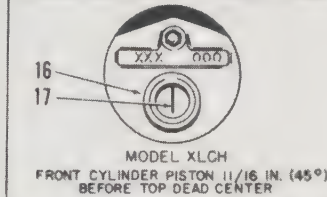
SETTING IGNITION TIMING

Ignition is timed with the spark advanced and is correctly set when the forward piston is 45 degrees ($11/16$ in.) before top dead center. This corresponds to the flywheel timing mark position when it is in the center of the inspection hole. Whenever the points are replaced, or at least annually, the timing should be set.

The 1965-1967 models have an adjusting screw which, when turned clockwise, advances the timing. A counterclockwise adjustment retards the timing. Applying mild pressure to the magneto housing will cause it to follow the movement of the adjusting screw. The correct amount

MANUAL CONTROL TYPE

FIXED POSITION TYPE

TIMING POSITION OF FLYWHEEL
TIMING MARK (ON LEFT SIDE OF ENGINE)

Sportster magneto

- | | | |
|-----------------------------------|--|-----------------------------------|
| 1. Induction coil | 10. Pivot screw | 16. Timing inspection hole |
| 2. Rotor | 11. Adjusting screw | 17. Timing mark |
| 3. Condenser | 12. Adjusting stud | 18. Narrow cam lobe |
| 4. Circuit breaker points | 13. Cam oiler felt | 19. Coil lead wire |
| 5. Safety gap (1964 and earlier) | 14. Magneto mounting bolts and nuts (1964 and earlier) | 20. Breaker point terminal |
| 6. Ignition cut-out terminal | 14A. Magneto mounting bolts (1965) | 21. Control wire (1965) |
| 7. Coil secondary terminal spring | 15. Magneto advance stop screw (1965 and later) | 22. Swivel block (1965) |
| 8. Cam follower | | 23. Control wire set screw (1965) |
| 9. Cam | | |

of spark retardation is obtained by backing off the setting stop screw until there is a distance of $\frac{3}{16}$ in. between its head and seat. Adjust the screw only one turn; more will affect retarded timing.

Late 1967 XLCH models have a slot and pin in the base plate which serves

the same function as the adjustment screw.

1. Remove the magneto cover, timing inspection hole plug, and spark plugs. Telescope or remove the front intake pushrod cover so that valve motion can be observed.

2. Place the transmission in High gear and put the motorcycle on its center stand so that the engine can be turned by rotating the rear wheel.

3. Set the contacts points. (See "Adjust Contact Breaker Points.")

4. Turn the engine until the exposed valve closes (travels to its highest point). Slowly rotate the engine in its normal running direction until the timing mark is aligned in the center of the inspection hole.

5. Align the timing marks on the magneto base and mounting plate.

6. If the narrow cam lobe is not located counterclockwise from the cam follower and the breaker points aren't beginning to open, the magneto must be adjusted. Be sure the spark is fully advanced.

7. On 1965 to early 1967 models, an adjustment can be made with the magneto advance stop screw.

8. If alignment, which will not interfere with the air cleaner, cannot be made through adjustment of the screw, or if it is a fixed-position magneto, lift up the magneto until its drive gears become unmeshed. Turn the cam the amount it was out of position and replace the magneto. Repeat this until the proper point timing is obtained and then secure the magneto.

9. A timing or continuity light is one accurate means of determining when the points begin to open. Attach one test lead to the terminal post or point spring and the other to a ground. When the points break contact the light will go out. Never turn on the key if a continuity light with a self-contained power unit is being used as this will blow the light's bulb. An emergency method is to place cellophane between the points and to tug gently on it. When the points begin to open, the cellophane will be released.

10. A strobe light provides the most accurate setting since it is done with the engine running. This takes up any end-play and automatically advances the timing. Leads are attached to the front plug, ground, and the positive battery terminal. Timing view plug, part HD (No. 96295-65), must be used to prevent oil spray. The engine should be operating at between 1,500 and 2,000 rpm.

11. Recheck ignition timing, always rotating the engine in the direction of

normal operation. Never overtighten the coil lead wire as this may damage insulators and cause a short circuit.

Valve Tappet Adjustment

Valve tappets must be adjusted with the engine cold. Adjust the tappets after the first 500 and 1,000 miles, and thereafter at every 2,000 miles.

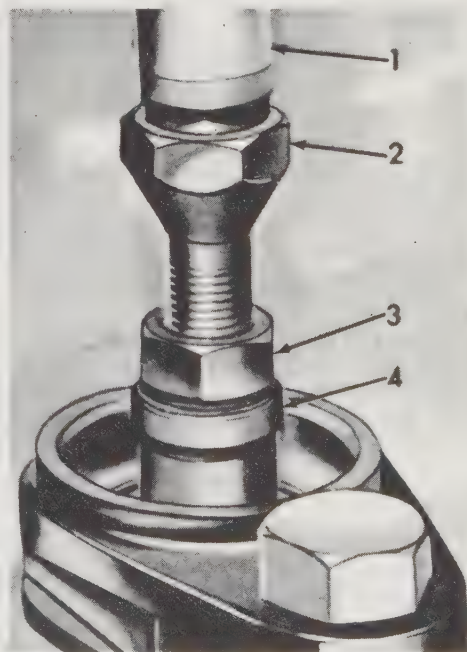
SPORTSTER

1. Press down on the pushrod cover retaining spring and remove the cover spring keeper.

2. Block up the telescoped cover so it doesn't slip down.

3. Rotate the engine until the valve that is to be adjusted is at its lowest position.

4. Loosen the tappet adjusting screw locknut and turn the adjusting screw into the tappet body until the pushrod is free and will shake slightly. Hold the pushrod just below the cylinder head and shake it toward the front and rear of the engine.



Sportster tappet adjustment

1. Push rod
2. Tappet adjusting screw
3. Tappet adjusting screw locknut
4. Tappet body

5. Gently turn the adjusting screw toward the pushrod until nearly all play is removed. Then back it off $\frac{1}{4}$ turn and secure the tappet screw locknut against the tappet body.

6. Check adjustment again for a slight amount of shake and the ability to rotate freely without any rough spots or binding.

7. Both ends of the valve covers must seat on the cork washers during reassembly.

8. Perform the above operations on the remaining three valve tappets.

GLIDE MODELS

1. Prepare for tappet adjustment as on Sportster models.

2. Loosen the tappet adjusting screw locknut and turn the adjusting screw into the tappet body so that the pushrod is shortened and will shake slightly.

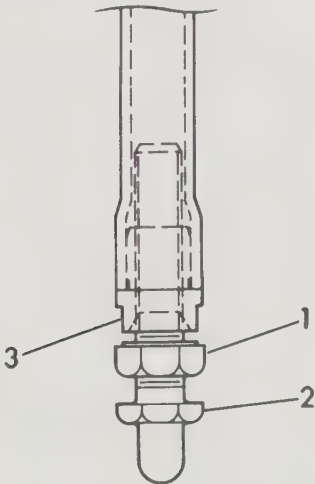
3. Hold the pushrod with a wrench and turn the adjusting screw down to lengthen the rod until all of the play is taken up.

4. Mark the adjusting screw position with chalk and turn it down four full turns.

5. Secure the locknut while holding the pushrod steady.

6. Secure the pushrod cover-spring cap retainers.

7. Perform the above operations on the remaining three valves.



Glide models tappet adjustment

1. Locknut
2. Adjusting screw
3. Pushrod

8. Use new gaskets whenever possible. Clean the surfaces with a safe solvent before fitting the gaskets.

Carburetor Adjustment

LINKERT MODEL "DC"

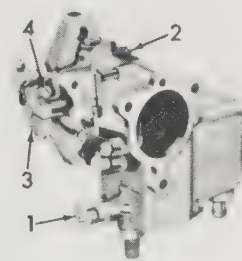
1. Check the cable adjustment to be sure that the throttle opens and closes fully. Run the engine until the normal operating temperature is reached.

2. Turn the low- and high-speed needles gently to their seat, and back the low-speed needle out $1\frac{1}{2}$ turns so that the engine will start. You may wish to turn the idle stop screw clockwise to raise the idle speed slightly.

3. With the choke in the fully opened position and the spark fully advanced, turn low-speed needle in slowly until the engine misses and runs irregularly. Turn the needle out counterclockwise until the engine runs smoothly with the throttle closed. A slightly richer mixture, obtained by turning the needle in, will aid starting and overall performance.

4. Adjust the throttle stop screw until the desired idle speed is obtained. Avoid an idle speed that is too slow, since this causes bearing wear, excessive oil consumption, and poor low-end performance.

5. After adjusting the idle, slight read-



SPORTSTER AND
ELECTRA GLIDE

Linkert model DC carburetor adjustments

1. High-speed needle
2. Low-speed needle
3. Throttle lever
4. Throttle stop screw

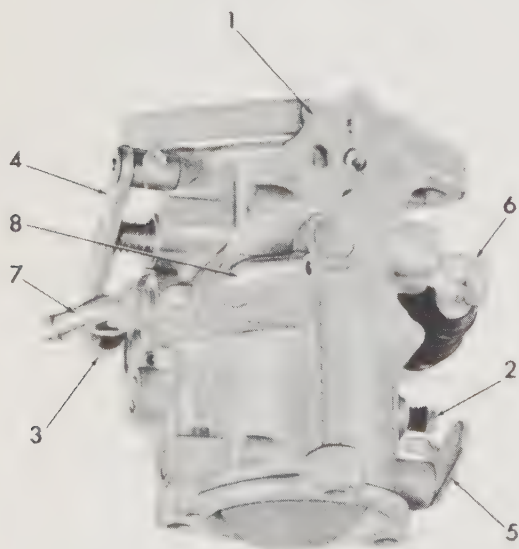
justment of the low-speed needle may be required.

6. Turn the high-speed needle $\frac{3}{4}$ – $1\frac{1}{4}$ turns off its seat and run the machine at various speeds from 20 mph up, with the spark fully advanced. If the engine runs roughly, make small adjustments until you are satisfied. There should be uniform smoothness throughout the speed range.

7. Once a proper setting is arrived at, further readjustment should require no more than $\frac{1}{8}$ turn of the low-speed needle and $\frac{1}{4}$ turn of the high-speed needle.

TILLOTSON MODEL "HD"

Radical changes, for the worse, in performance are not likely to be relieved by an adjustment and are probably due to a blocked passage or an air leak. Before attempting an adjustment, examine all mountings, filters, screens, and lines, and check for leaks (with the engine hot) by dripping small amounts of oil on the seams and by watching for bubbling when the engine is started. Consult the troubleshooting section before doing anything to the carburetor if you aren't sure of the cause of the trouble.



Tillotson model HD carburetor adjustments

1. Low-speed needle
2. Intermediate speed needle
3. Throttle stop screw
4. Throttle lever
5. Choke lever
6. Accelerating pump
7. Inlet fitting
8. Vent fitting

The low-speed needle should never have to be readjusted for atmospheric variations by more than $\frac{1}{8}$ turn, richer or leaner, and the intermediate needle should not need more than $\frac{1}{4}$ turn richer or leaner because the fuel supply is decreased; counterclockwise makes the engine run richer. Idle is adjusted by the idle stop screw.

If atmosphere, altitude, or modifications to the engine or exhaust system renders adjustment ineffectual, the following main jets may be substituted: 0.049, 0.051, 0.053 (Electra-Glide standard jet), 0.055, 0.057, (Sportster standard jet), 0.059, 0.061, or 0.063.

1. Loosen the cable adjustment so that the throttle lever will open and close fully in response to handlebar manipulation.

2. Turn both the low and intermediate-speed needles in to their seats and then back out about $\frac{7}{8}$ turn. This adjustment will allow the engine to start but will cause it to run too richly.

3. When the engine reaches normal operating temperature, open the choke all the way and fully advance the spark.

4. Set the throttle stop screw so the engine idles at about 2,000 rpm.

5. Turn the intermediate needle in both directions until the engine runs at its smoothest, with no surge, and with a constant rpm pulse. When the optimal setting is achieved, back the needle out $\frac{1}{8}$ turn so the mixture is slightly rich.

6. Adjust the idle stop screw so the engine runs at about 900–1,000 rpm.

7. Adjust the idle needle in the same manner as the intermediate needle.

8. Recheck both needle adjustments.

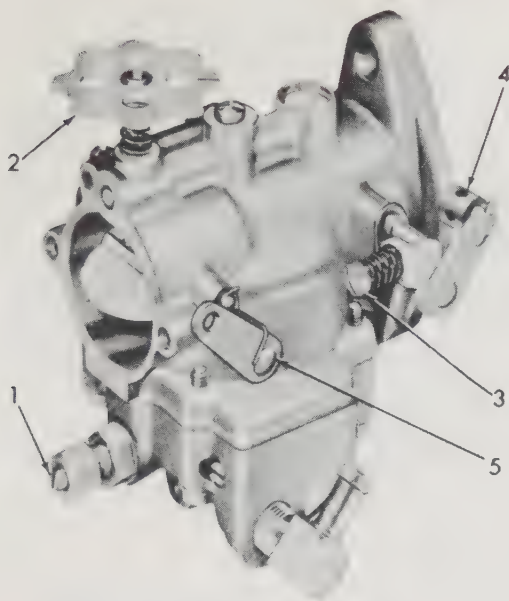
The idle mixture is made richer by turning the adjusting screw to the right and is made leaner by turning it to the left. The main nozzle provides a richer mixture when the screw is turned to left and leaner when turned to the right.

TILLOTSON MODEL "MD"

1. Gently turn the adjusting screws in until they reach their seats then back main needle out $1\frac{1}{2}$ turn and back the idle needle out $\frac{3}{4}$ turn.

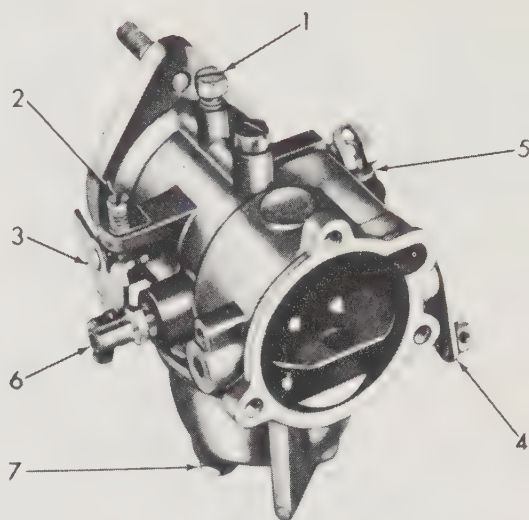
2. Make sure that the cable allows the throttle to close fully.

3. With the engine idling at normal speed and temperature, and the throttle



Tillotson model MD carburetor adjustments

1. Main mixture adjusting screw
2. Idle mixture adjusting screw
3. Idle speed stop screw
4. Throttle control lever
5. Choke lever



Bendix model 16P12 carburetor adjustments

1. Low-speed mixture needle
2. Throttle stop screw
3. Throttle lever
4. Choke lever
5. Accelerating pump
6. Inlet fitting
7. Bowl drain plug

closed, adjust idle to desired rpm. Turning the screw to the right will increase the idle speed and turning it to the left will decrease it. Avoid excessively slow idle speeds.

4. Make idle mixture fine adjustment.

5. Road test the motorcycle at various speeds and make a fine, main needle adjustment until the engine operates smoothly throughout its range.

BENDIX MODEL 16P12

Once properly adjusted, major changes should not be necessary. Check for fouled or bad plugs, improper timing, poor valve adjustment, clogged air cleaner, or air leaks at the manifold or gas line.

The low-speed needle is turned clockwise for a leaner mixture or counterclockwise for a richer mixture.

1. Gently turn the low-speed mixture needle clockwise to its seat, then back it out $\frac{1}{2}$ turn. The engine should start at this setting but will run too richly.

2. Make sure the cable allows the throttle to close fully.

3. With the engine at normal operating temperature, set the throttle stop screw to

the desired idle speed. Avoid excessively slow idle speeds, as this will make starting difficult, waste oil, and will burn bearings.

4. Readjust the low-speed needle to the point where the engine runs at its smoothest and at its highest rpm.

5. Reset idle to 700–900 rpm.

6. If the exhaust system is modified or if the machine is to be operated at high altitudes, one of the following main jets may be substituted: nos. 90, 95, 100, 105, 110, 115, 120, and 125. When changing jets, go up one size at a time until you are satisfied.

7. Late 1971 and later pump shafts are adjustable. The bottom hole provides the richest setting and the top hole provides the leanest.

Spark Plugs

SPARK PLUG INSTALLATION

When replacing spark plugs, follow these steps:

1. If the plug has been used before, dry it thoroughly, then clean the elec-

trode on a sand-blaster, wire wheel, with a point file, emery paper, or fine sand paper, then blow clean.

2. Gap the plug at 0.020 in.

3. Install a new metal washer whenever possible.

4. Coat the threads with graphite.

5. Screw the plug in finger-tight, then secure it to 15 ft lbs torque. If a torque wrench is not available, turn the plug in $\frac{3}{4}$ turn from the finger-tight position using a plug wrench or a 14 mm, deep socket.

Tune-up Analysis

The carburetor jets and spark plugs with which your motorcycle came equipped are those which will provide the most efficient performance in the most frequently encountered climates. These should suit your purposes, with perhaps minor carburetor adjustments, unless you enter a region of radically different altitude or atmospheric conditions.

If there are no mechanical deficiencies present, spark plugs will be the best indication of how your engine is running and should be examined in the following manner:

SPARK PLUG READINGS

1. Adjust the timing, tappets, and carburetor.

2. Remove and clean the plugs or install new ones. Make sure the gap is set correctly at 0.020 in.

3. Run the machine up to high rpm, pull in the clutch, and turn off the engine. Do not release the clutch until the transmission is in Neutral, or the bike is completely stopped.

4. Remove the plug and examine for the following conditions:

a. A wet, black, and shiny deposit on the plug base, electrodes, and ceramic tip (around the positive electrode) indicates an oil-fouled plug caused by worn rings and pistons, loose valves, weak spark, faulty ignition circuit, improper point gap, dirty points, improper timing (overly retarded), weak coil, or a plug that is too cold.



Oil fouled

b. A smooth, sooty, jet-black deposit indicates an excessively rich gas mixture, long periods of engine idling, or too cold a plug.

c. A very light brown, dry, blistered, or glassy-looking deposit indicates an overheated plug. This may be accompanied by cracks in the ceramic tip and is caused by an overly lean air-fuel mixture, an excessively high operating temperature, improper valve seating, advanced ignition timing, or a plug that is too hot. The deposit becomes a conductor when hot and causes irregular firing, especially at high rpm.

d. A plug with a milky or tan deposit



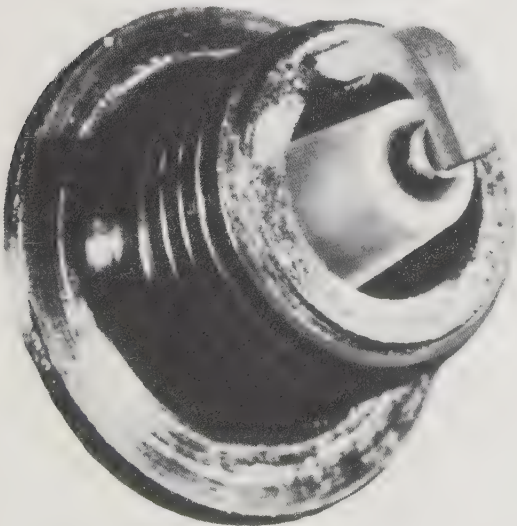
Carbon (cold) fouled



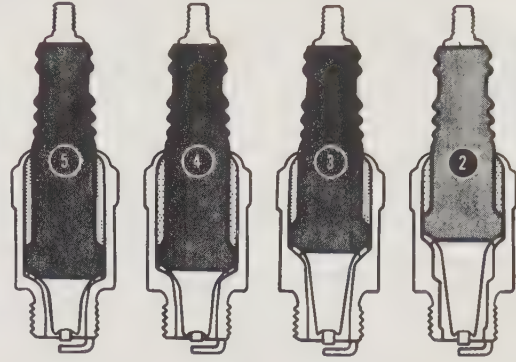
Overheated

indicates a well-balanced ignition and mixture. This type of deposit will not adversely affect performance if kept to a minimum but no type of deposit should be allowed to build up. Both plugs should burn the same way.

When in doubt about the conditions of your plugs, it is best to replace them. This is the best rule for efficiency. Remember, spark plugs, like any other component, can be defective from the start. Plugs should also be replaced if the ceramic portion is cracked since this will cause stray spark. Never use a plug without a gasket because this may cause damage to the seat and cause compression loss.



Normal



Spark plug heat range is a function of center electrode insulator length

SPARK PLUG HEAT RANGE

Spark plugs are generally intended to maintain a temperature range of between 450 and 850° C under varying engine operating temperatures. If the temperature at the tip drops below 450° C, the electrode will foul with carbon deposits; if it rises above 850° C, pre-ignition and possible engine damage will result. This is why varying heat ranges are available in one step gradations from 2-7 indicating hottest to coldest. Plugs 7 and 3-4 are special purpose plugs.

The first consideration in correcting an improper spark plug condition is changing heat ranges. Never go more than one step at a time. Use a hotter plug for short rides at low speeds and a colder plug for touring or high-speed use. If the plugs aren't right after changing one step, a carburetor adjustment is in order.

CARBURETOR MIXTURE ADJUSTMENT

Adjust the carburetors as directed in the "Carburetor Adjustment" section. In most cases, adjustments at the needles can compensate for mixture deficiencies, but the jets may be exchanged if necessary.

An excessively rich mixture can be remedied by installing a main jet that is one step smaller; an excessively lean mixture can be corrected by installing a main jet that is one step larger.

If a change of more than one size is required, change step by step.

CYLINDER COMPRESSION CHECKS

Compression checks, like spark plug readings, are a good indication of the engine's condition. Periodic compression

checks will give a good warning of serious trouble. It is advisable to perform a compression check with every tune-up. A compression test should be done as follows:

- 1. Remove the spark plug and install a compression gauge in its place.
- 2. Hold the throttle open and turn the engine over five times. A minimum of 100 psi should be indicated, with no more than a 15 psi difference between

cylinders. Perfect compression is between 150 and 165 psi.

A sudden drop in compression between tests indicates a serious mechanical problem. If a gradual drop in pressure is found, normal wear is the cause. If there is an increase in pressure from a previous test, excess carbon buildup on the piston top is the problem. Remove the cylinder head and scrape off piston and cylinder deposits with a blunt blade.

Tune-up Specifications

	Sportster	Glide Models
IGNITION TIMING		
Breaker point setting (gap)	①	②
Dwell	③	
Ignition timing (retarded)	④	5° (1/64 in.) BTC
Ignition timing (advanced)	⑤	35° (7/16 in.) BTC
SPARK PLUGS		
Spark plug gap setting (magneto ignition)	0.020 in.	—
Spark plug gap setting (battery ignition)	0.025–0.030 in.	0.025–0.030 in.
Spark plug heat range (average use)	#4	#3–4
TAPPET ADJUSTMENT		
Tappet clearance (cold)	0.006 (in.) 1/4 turn loose from a no lash position	1/8 (4 turns) from seat
CLUTCH ADJUSTMENT		
Clutch Spring Adjustment	⑥	⑦
CARBURETOR ADJUSTMENT		
See “Carburetor Adjustment” section		

- ① Breaker point setting (gap)
battery ignition: 1970 & earlier: 0.020 in.
1971 & later: 0.018 in.
- ② Breaker point setting (gap)
1971 & earlier: 0.020 in.
1972 & later: 0.018 in.
- ③ Dwell
1971 & earlier: 90° at 2000 RPM
1972 & later: 140° at 2000 RPM
- ④ Ignition timing (retarded)
1971 & earlier: 15° (3/64 in.) BTC
1972 & later: 10° (1/32 in.) BTC
- ⑤ Ignition timing (advanced)
1971 & earlier: 45° (1/16 in.) BTC
1972 & later: 40° (17/32 in.) BTC

- ⑥ Clutch Spring Adjustment
1970 & earlier: 3/16 in. from inner surface of spring tension plate to outer surface of spring cup flange, 11/32 in. from outer drive plate surface to releasing disc outer surface.
- ⑦ Clutch Spring Adjustment
1967 & earlier: 31/32 in. from edge of spring collar to surface of outer disc.
1968 & later: 11/32 in. from edge of spring collar to surface of outer disc.

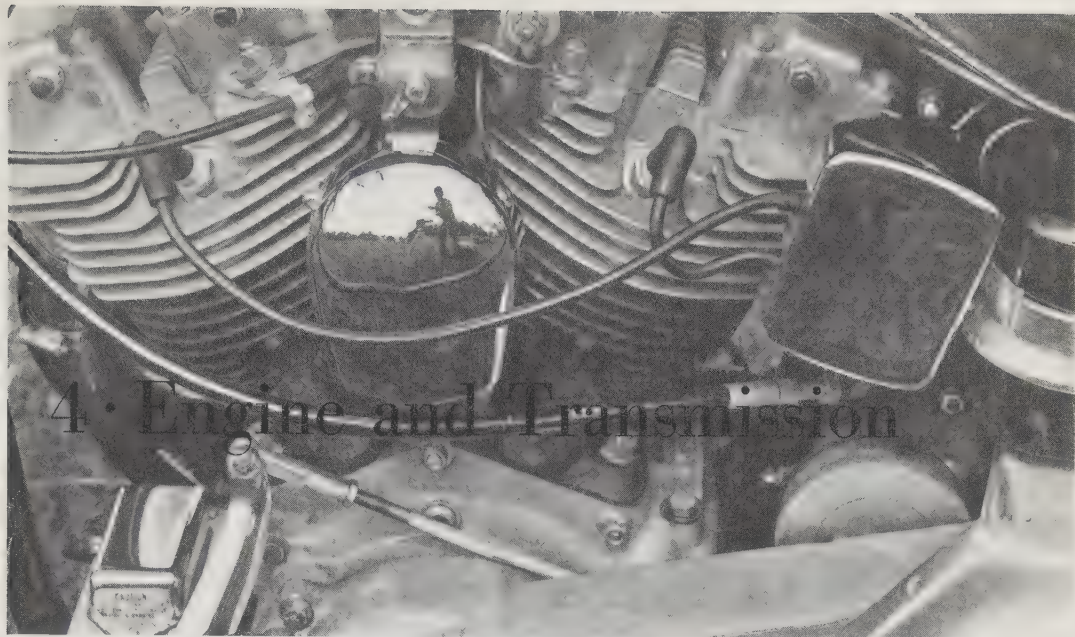
Spark Plug Comparison Chart

THREAD SIZE	HEAT RANGE	NGK		CHAMPION		AC S—Projected Type	DENSO	BOSCH	KLG P—Pro- jected Type	AUTO-LITE
		STAND- ARD TYPE	PRO- JECTED TYPE	Type	Electrode					
14 mm	hot	B-4	BP-4	{J14J, J14Y, UJ18Y J12J, UJ12 J11, J11J}	C49, 46S 48, C47, C47W, M47 46, C46, M46			W45T3	FS20 FS30, FS45P	A82 A11, AT10, AZ9
		B-6S	BP-6S	{J13Y, UJ12Y, J11Y, J12Y J10Y, UJ10Y, J8, J8J}	45, C45, C45W, M45, 45S 44, C44, M44, M44B, 44S	W14		W145T3	FS50, FS55P FS70	A9, AT8, A9XM A7, AT6, A42 AT4
		B-7S		{J7, J7J, UJ8 J6, UJ6, J6J J5}	MC44 43, C42-4, C43, 43S, MC42 M44C, M43	W17		W175T3		
		B-7C° B-77C°		J62R		W22		W225T3	FS75	A3, AT3
		B-8S B-9S B-10		J4, J4J, J61Y, J60R J2J, J57R	42, C42-1, M42 41			W240T3	FS100 FS100-2	A23 AT2 AT1 A901
14 mm 7/16 in. Reach	hot	B-4L		{H12 H11 H10, H10J, H18Y H8, H8J H14Y}	47L 45L, C45L, TC45L 43L, C43L, C43LY	W24		W125T4		AL11 AL9, ATL8 AL7, A7 ATL4, ATL3
		B-6L								
14 mm	hot	B-4H	BP-4H	L14, UL15Y, L10 L90	46FF, 46FFS, 45FFS, 45FF 45F, M45FF	W9FP W14F		W95T1	F20, F50 F55P	AE52, AE6
		B-5HS		{L86, L85, L95Y L12Y, L88	44FFS, 44FF, M43FF 44F, 43F, 43FFS	W17F		W145T1	F70, F65P F75	AE4, AE42 AE3, AE32 AE2, AE22
		B-6HS	BP-6HS	{L7, L87Y, UL87Y L81, L82Y, UL82Y L5}	42FF, 42FF, 42FS M42FF, MC42F	W22F		W175T1, W175T7 W200T7, W200T35 W225T1, W225T35 W225T7		
		B-7HS	BP-7HS							
		B-7HC° B-7HZ B-77HC°		L62R		W24F		W240T1, W240T16 W260T1	F80 F100	
1/2 in. Reach	cold	B-8HS		L4J, L64Y, L66Y				W270T16		AE903
		B-8HCS°		L60R				W280M1		
		B-9HS						W310T16		AE603
		B-9HCS°		L57R						
		B-10H								

Spark Plug Comparison Chart (cont.)

THREAD SIZE	HEAT RANGE	NGK		CHAMPION		AC S—Projected Type	DENSO	BOSCH	KLG P—Pro- jected Type	AUTO-LITE
		STAND- ARD TYPE	PRO- JECTED TYPE	Y—Projected Type	G—Gold Palladium Electrode					
14 mm	hot ↑	B—4E	BP—4E	{ N21, N16Y N18 N8, N14Y, N13Y N84, N88 N6, N12Y, UN12Y N11Y, N10Y, N5 N9Y, N8Y N4 N62R N6Y, N7Y N3 N60R, N2	{ 47XL 46XLS 46N, 46XL, 45XLS 45N, 45XL, C45XL 44N, 44XL, 44XLS 44XLS, 43XLS, 43N, 43XL C42N 42XL, 42XLS 41XLS		W9EP W14E W14EP W17E W20EP W22E, W22ES	W95T2, W125T2 W145T2 W145T30, W160T2 W175T2, W175T30 W200T27, W200T30 W225T2, W230T30	FE20 FE30 FE50, FE45P AC5 FE70, FE55P FE75 AC3, AC32 FE80, FE65P AC2, AG23	AG9 AG7, AG52 AG5 AC4, AC42 AC3, AC32 AC2, AG23
		B—5ES	BP—5ES							
		B—6ES	BP—6ES							
	cold ↓	B—7ES	BP—7ES	{ B—7EC* B—77EC*			W24E, W24ES W27E W31E	W240T2, W240T28 W250P21, W250T28 W260T28, W265P21 W280M2, W300M2	FE100 FE220 FE250	AG701
		B—8ES	BP—8ES							
		B—9ES								
¾ in. Reach	hot ↑	B—10E		{ UBL13Y BL11Y		46TS, 45TS 44TS	WA125T40			AF52 AF42
	cold ↓		BP—7FS							
12 mm	hot ↑	D—4H		P—8Y P—7 P—6		S124FS S122F S121F	X17F X20FS X24FS X28FS	X175T1 X260T1 X300T1 X320T1	TW270 TW275 TW280	HE3 HE2 HE1
	cold ↓	D—5HS D—6HS D—8HS D—10HS								
12 mm	hot ↑	D—4E D—6ES D—7E D—7ES D—8E D—8ESL D—8ES D—10E D—10ES		R—61 R—6, R—6G		S123XL S121XL	X20E X22E, X22ES X24E, X24ES	X240T17 X270T17 X300T2		
	cold ↓									
¾ in. Reach										

* Competition type with short side electrode



Operational Description

All the Harley-Davidson V-Twin models have air-cooled, four-cycle engines, with rocker-arm-actuated, overhead valves. Displacements range from 55 or 61 cu in. on Sportsters, and 74 cu. in. on Glide models.

Both pistons, set 45 degrees apart, are connected to a single crankpin which is attached to a built-up crankshaft. The pin sits slightly off-center between two counterweighted flywheels. Piston motion drives the flywheels in a clockwise (as viewed from the right-side) circular motion.

Valves, ignition, crankcase breather, and the generator are all driven by the gear train located in the gearcase. Sportsters have four, single-lobe camshafts which actuate the valve tappets, and consequently, the valves. Hydraulic lifters are used on Glide models to reduce heat-related play.

Both cylinders fire once in 720 degrees of flywheel rotation. The rear cylinder fires 315 degrees after the front cylinder and the front cylinder fires again in another 405 degrees.

Sportsters and 1965 and later Glide models have a single set of contact points to produce ignition spark. A double-

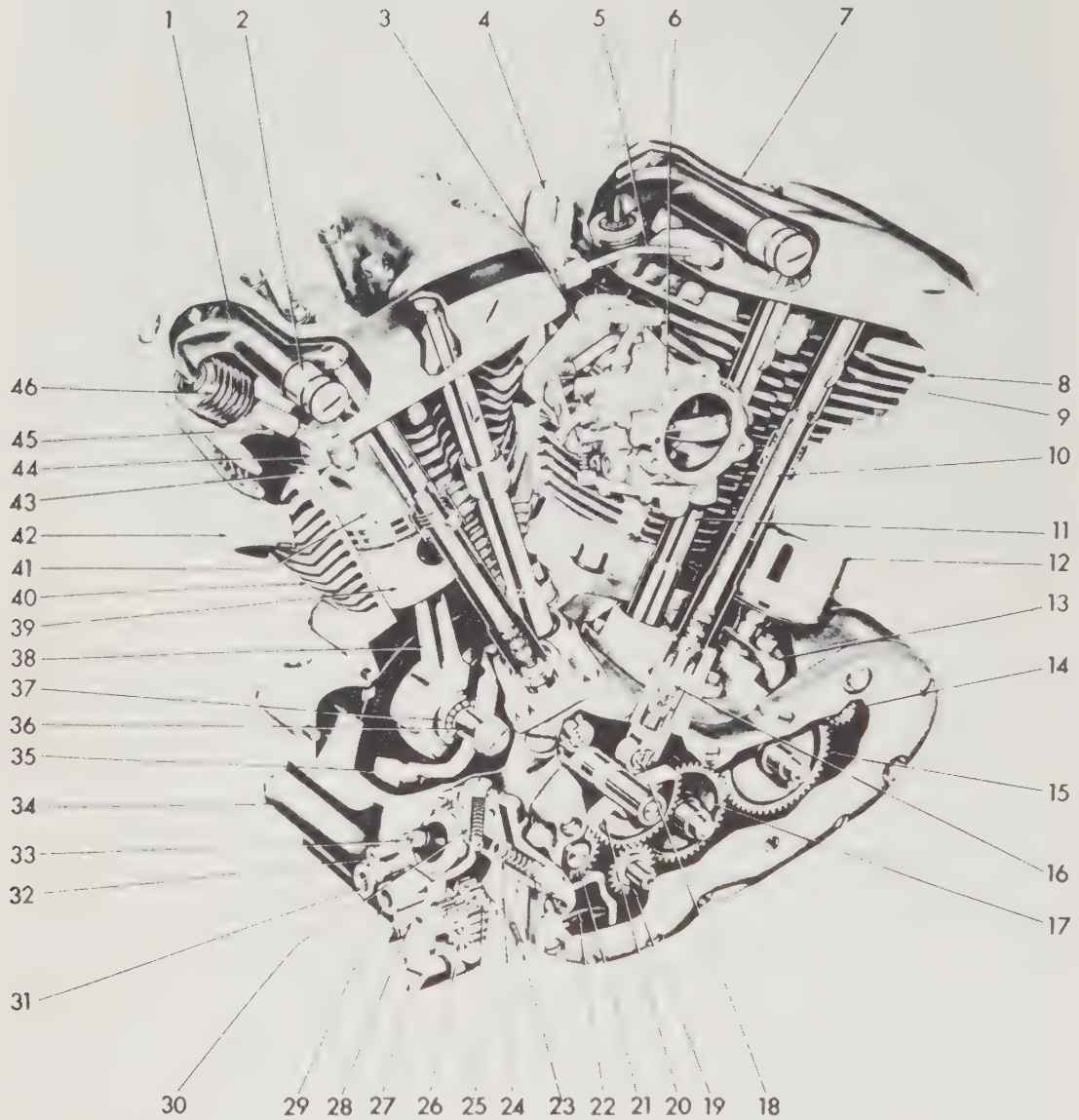
lobed cam times both cylinders and both plugs spark each time the crankshaft revolves. Only one cylinder fires at a time, however, since one is on its combustion stroke while the other is on its exhaust stroke.

Engine Removal and Installation

SPORTSTER

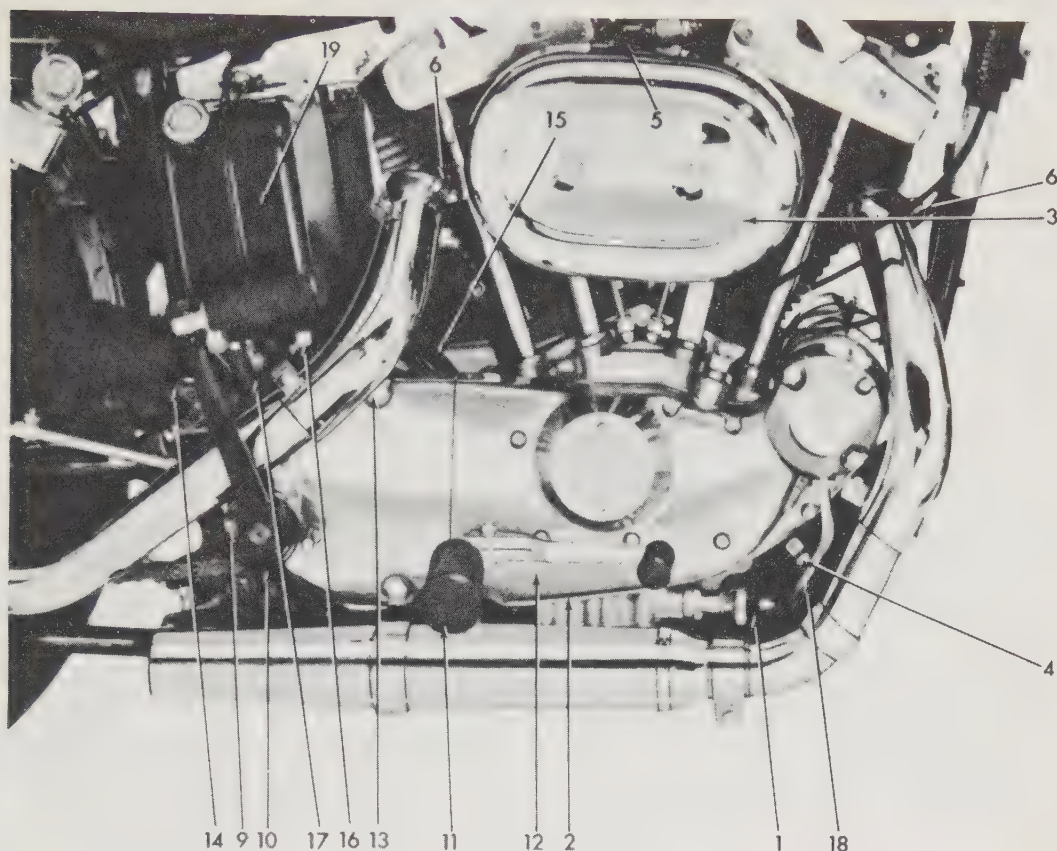
1. Remove the seat, drain the gas and oil, and remove the gas tank. The following steps pertain to the right-side of the machine:

2. Remove the air cleaner assembly.
3. Disconnect the throttle and choke cables at the carburetor.
4. Remove the top center engine support bolt, taking note of the number and placement of the spacer shims.
5. Remove the exhaust assemblies.
6. Disconnect the spark plug cable from the contact breaker or magneto.
7. Remove the starter crank and spring.
8. Place the transmission in Fourth gear and remove the right footrest and the shifter lever.



Engine cutaway view (1967 Glide model)

- | | | |
|-----------------------------|--------------------------------|-----------------------------------|
| 1. Rocker arm | 17. Intermediate gear | 32. Chain oil return |
| 2. Rocker arm shaft | 18. Tappet and roller assembly | 33. Oil pressure switch |
| 3. Carburetor insulator | 19. Pinion gear | 34. Crankcase |
| 4. Engine mounting bracket | 20. Cam gear | 35. Flywheel |
| 5. Oil line | 21. Breather gear | 36. Crankpin |
| 6. Carburetor | 22. Breather screen | 37. Connecting rod roller bearing |
| 7. Rocker arm cover | 23. Chain oiler screw | 38. Connecting rod |
| 8. Cylinder head | 24. By-pass valve | 39. Piston |
| 9. Pushrod cover keeper | 25. Oil feed pump drive gear | 40. Cylinder |
| 10. Pushrod | 26. Oil scavenger drive gear | 41. Overhead oil line |
| 11. Pushrod cover | 27. Oil feed nipple | 42. Exhaust port |
| 12. Circuit breaker (timer) | 28. Oil pump cover | 43. Exhaust valve seat |
| 13. Clamp | 29. Oil return nipple | 44. Exhaust valve |
| 14. Generator drive gear | 30. Check valve | 45. Exhaust valve guide |
| 15. Idler gear | 31. Breather outlet | 46. Valve spring |
| 16. Hydraulic valve lifter | | |



Right-side view, 1972 XLCH

- | | | |
|---|--------------------------------|---------------------|
| 1. Oil pressure switch wire | 6. Exhaust pipe port clamp (2) | 14. Rear chain |
| 2. Clutch control cable (1970) | 9. Starter crank clamp bolt | 15. Oil return line |
| 2A. Clutch control cable (1971 and later) | 10. Starter spring | 16. Oil vent line |
| 3. Cleaner assembly | 11. Footrest | 17. Oil feed line |
| 4. Clip | 12. Foot shift lever | 18. Breather pipe |
| 5. Engine support bolt location | 13. Cover bolt (2) | 19. Oil tank |

9. Remove the transmission sprocket cover. Disconnect the clutch cable.

10. Remove the drive chain from the countershaft sprocket.

11. Remove the oil return line.

12. Remove the oil vent and oil feed lines.

13. Remove the clutch cable and oil pressure switch.

14. Disconnect the speedometer cable. The following steps pertain to the left-side of the machine:

15. Loosen, but do not remove, the top front engine mounting bolt.

16. Remove the remaining three, front engine mounting bolts.

17. Remove the tool box (1966 and earlier XLH).

18. Remove the battery tie rod support (1966 and earlier XLH).

19. Disconnect the battery ground wire (XLH) and the spark plug cables.

20. Remove the horn and engine support bracket (1965 and later XLCH and XLH).

21. Disconnect the throttle cable and support bracket at the carburetor.

22. Remove the battery cover and disconnect both terminal leads on XLH models.

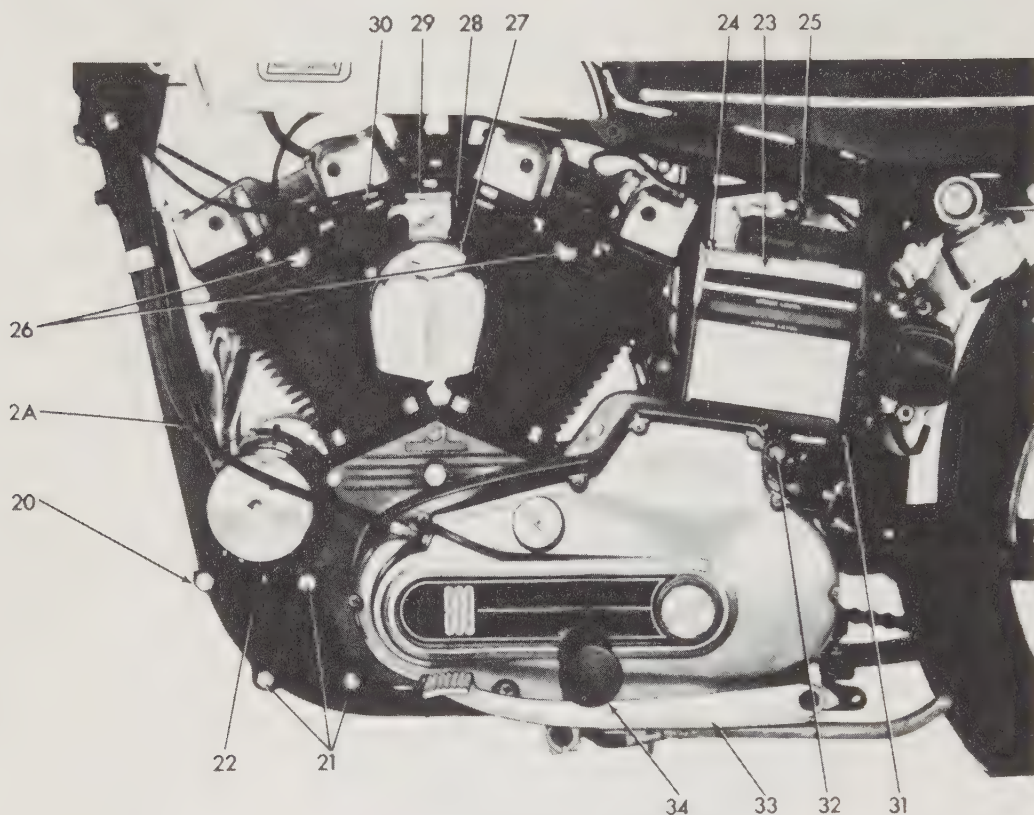
23. Remove the oil vent line at the crankcase (1966 and earlier models).

24. Disconnect the contact breaker-to-coil lead.

25. Remove the battery, battery carrier, and oil tank (1967 models).

26. Remove the regulator ground strap and the two, top rear, engine mounting bolts.

27. Remove the rear brake lever and



Left-side view, 1971 XLCH

- | | | |
|---------------------------------|---------------------------------------|----------------------------|
| 20. Top front end mounting bolt | 25. Spark plug | 31. Regulator ground strap |
| 21. Engine mounting bolts | 26. Horn cover | 32. Engine mounting bolt |
| 22. Safety guard bolt hole | 27. Wire | 33. Foot lever and spring |
| 23. Battery | 28. Support bracket and choke control | 34. Left footrest |
| 24. Battery carrier | 29. Support bracket bolt | |

return spring on all models, and the stop switch on 1966 and earlier models.

28. Remove the left footrest.

29. Remove the two, lower rear, engine mounting bolts.

30. Remove the top front engine mounting bolt.

31. With the engine tilted forward, lift it up and out of the left side of the frame.

GLIDE MODELS

For cylinder work with the engine still in the frame, complete the following steps:

1. Remove the instrument cover mounting base screw and pry off the cover side plate.

2. Remove the seat.

3. Remove the shift lever bottom bolts to remove the gas tank on hand-shift models.

4. Drain the gas tank and remove it.

5. Remove the cylinder head bracket, taking note of the number and position of the spacers for reassembly.

6. Remove the spark plugs and disconnect the battery ground wire.

7. Remove the carburetor manifold clamps and the air cleaner assembly.

8. Disconnect the throttle and choke cables from the carburetor, then remove the fuel and vent lines, carburetor, and its support bracket.

9. Disconnect the exhaust pipes at the cylinders. Disconnect and reposition the regulator without removing it. Follow the steps below to remove the engine crankcase from the frame:

10. Remove the left footrest, primary chaincase cover, compensating sprocket, or shaft nut. Remove the chain adjuster mounting bolt and clutch assembly.

11. Remove the engine sprocket shaft

chain cover. Loosen the transmission base mounting bolts. Remove the inner chainguard-to-transmission mounting bolts.

12. Remove the clutch hub, shaft key, starter housing chainguard nuts, solenoid wire, inner chainguard from mainshaft, chain oiler hose at oil pump, and the remaining hoses.

13. Disconnect the coil leads, generator wires, and oil switch wire.

14. Drain the oil tank and remove the oil lines at the oil pump. Remove the crankcase breather tube.

15. Remove the right footrest and the brake master cylinder assembly.

16. Remove the exhaust system.

17. Remove the front and rear engine mounting bolts. The engine may now be lifted clear of the frame through the right side.

Cylinder Head and Valves

SPORTSTER

Removal

1. Strip the motorcycle as described in "Engine Removal" following Steps 1-6, 7, 20, 21, and 24.

2. Remove the air cleaner assembly, carburetor support bracket, carburetor, manifold clamps, and manifold.

3. Remove the oil line nuts and rubber sleeves.

4. Remove the spark plugs.

5. Remove the pushrod cover spring keepers while holding the spring retainers down.

6. Telescope the valve covers.

7. Rotate the engine until there is clearance at both tappets. The valves are now closed.

8. Remove the cylinder head bolts and washers.

9. If necessary gently tap the base of the head with a soft mallet to loosen it and lift the entire assembly free through the left side of the frame. Lightly oil the piston crown and cylinder.

10. Separate the pushrods and mark them for replacement in their original positions.

Disassembly

1. Remove the rocker arm cover bolts and washers.

2. Remove the rocker arm cover, tapping it gently with a soft mallet to loosen it if necessary.

3. Inspect the rocker arm surfaces, for excessive wear, where they contact the valve stems and pushrods.

4. Check the rocker arm shaft and bushing for excessive play.

5. If replacement of the above items is necessary, remove the rocker arm shaft, O-ring, acorn nut, and washer.

6. Drift the shaft from the cover and remove the rocker arm spring, arm, and spacer, and separate them for replacement in their original positions. It is not a good idea to mix parts since this will affect clearances and since some parts are not interchangeable.

7. Compress the valve springs using Valve Spring Compressor (H-D Part No. 96600-36), or any suitable spring compressor and remove the valve keys spring collar, springs, and valves. Separate the parts for replacement in their original positions.

Inspection

1. Clean all parts in a suitable solution and blow them dry, taking care to blow all passages clear.

2. Replace the oil line nut rubber sleeve and the gaskets if worn. Replace the shaft O-ring.

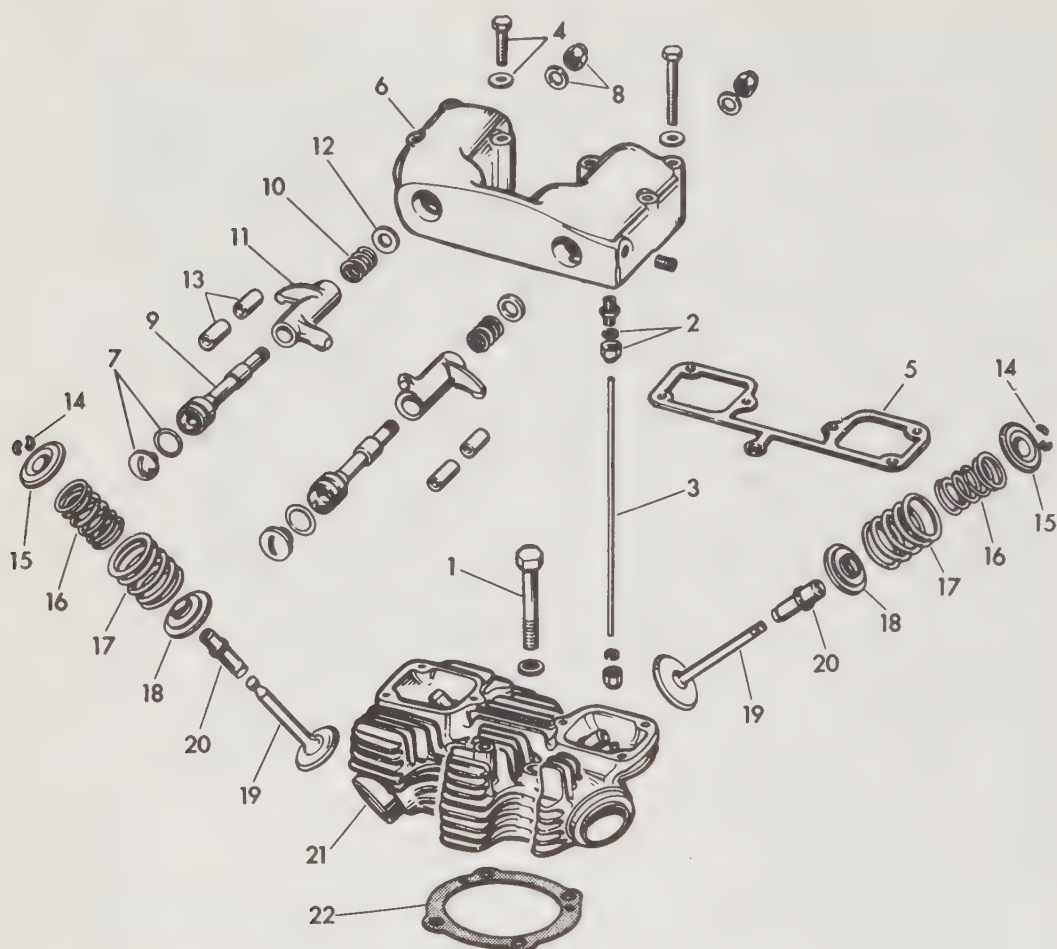
3. Inspect the rocker arm and shaft for wear and replace them if necessary. Rocker arm pads may be ground free of pitting or uneven wear.

4. Replace shaft bushings if play exceeds 0.002 in. Bushings are a press-fit and must be drifted out from the acorn nut side. Inserting a $\frac{5}{8}$ -11 thread tap will aid in the drifting procedure. Line-ream the new bushing with Reamer (H-D Part No. 94804-57) or a suitable substitute.

5. Soak the head in a suitable solvent until all of the carbon deposits are soft, then gently scrape it clean and brush it with a wire brush, taking care not to scratch the head face.

6. Blow the cylinder head and passages clear and clean again in a suitable solvent.

7. Inspect the valve and valve seat for



Sportster cylinder head assembly

- | | |
|---|------------------------------------|
| 1. Cylinder head bolt and washer (4) | 12. Rocker arm spacer (2) |
| 2. Oil line and rubber sleeve (2) | 13. Rocker arm bushing (4) |
| 3. Rocker arm cover-to-crankcase oil line | 14. Valve key (4) |
| 4. Rocker arm cover screw and washer (7) | 15. Valve spring under collar (2) |
| 5. Rocker arm cover gasket (2) | 16. Inner valve spring (2) |
| 6. Rocker arm cover | 17. Outer valve spring (2) |
| 7. Rocker arm shaft screw and O-ring | 18. Valve spring lower collar (2) |
| 8. Rocker arm shaft acorn nut and washer (2 each) | 19. Intake and exhaust valve |
| 9. Rocker arm shaft (2) | 20. Intake and exhaust valve guide |
| 10. Rocker arm spring | 21. Cylinder head |
| 11. Rocker arm (2) | 22. Cylinder head gasket |

a pitted or corroded condition which may adversely affect seating. Consult "Valve and Valve Seat Refacing" for procedures or replace. Seats which are cracked or loose must be replaced as described in "Valve Seat Insert Replacement."

8. Remove the valve head and the stem carbon deposits with a wire wheel or blunt knife, taking care not to scratch or nick the surface. The stem may be polished with fine emery cloth or steel

wool. Warped, bent, or otherwise damaged valves must be replaced.

9. Intake valve guides may be cleaned up with a $\frac{5}{16}$ in. reamer and the exhaust valves with a $\frac{11}{32}$ in. reamer.

10. Inspect the guides for excessive stem clearance. Consult "Engine Specifications" for proper measurements.

11. Replace the pushrods if warped, bent, or flattened at the ball ends.

12. Inspect the valve springs and check for proper tension and length.

Springs which are more than $\frac{1}{8}$ in. shorter or which have 5 lbs less tension than listed in "Engine Specifications" must be replaced. A Valve Spring Tester (H-D Part No. 96797-47), or a suitable substitute, may be used. If the springs are still their original length, they may be used even if their strength isn't checked.

Pushrod Removal and Installation

1. Rotate the engine until the tappet is at its lowest position.
2. Turn up the adjusting screw locknut until it is seated against the adjusting screw.
3. Turn down the adjusting screw, into the tappet body, until it reaches its seat.
4. Pry the pushrod up and to the side, taking care not to bind the upper end in

the rocker housing, and remove the rod and cover assembly.

5. Install new cork cover washers in the rocker cover and tappet guide, taking care not to damage them. Install a new cork washer in the pushrod cover also, taking care to seat all washers.

6. Assemble the pushrod assembly in the reverse order of disassembly and adjust tappets as described in "Valve Tappet Adjustment."

Assembly

Assemble in reverse order of disassembly. Note the following:

1. Lightly oil the valve seats and stems.

2. Place the lower valve spring collar over the guides, taking care to seat it properly.

3. Install the springs and upper collars, and use a compressor to replace the valve keys. Keys are easily handled by placing a dab of grease on a screwdriver tip, and can be temporarily secured until the springs are released by greasing the key grooves.

4. Install the rocker arm spacer, spring, and arm.

5. Lightly oil the rocker arm shaft and install it so that the spring ends are flush with the spacer and arm.

6. Secure the shaft O-ring, shaft screw, acorn nut washer, and acorn nut. Check arm action for binding.

7. Check to see that the cylinder head and rocker arm surfaces are still clean and apply a thin coat of aluminum paint to the head face if a cover gasket is not to be used.

8. Carefully install the cover gasket, if applicable, and install the cover in either case.

9. Turn the screws to a snug fit and then turn each $\frac{1}{8}$ – $\frac{1}{4}$ turn at a time until the cover is secure.

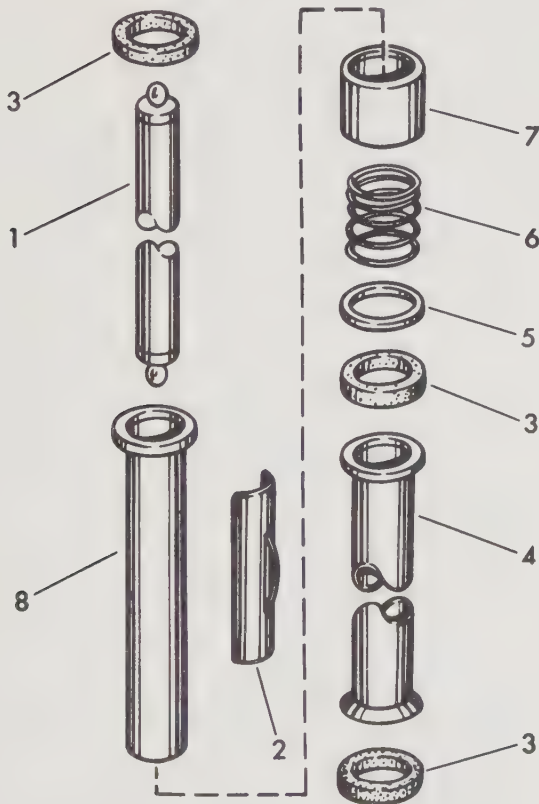
Installation

Install in the reverse order of disassembly. Note the following:

1. Cylinder and head faces must be absolutely clean.

2. Lightly oil or grease both sides of a new head gasket and align it on the cylinder.

3. With the valve tappets in their lowest position, install the head assembly.



Sportster pushrod assembly

1. Pushrod
2. Cover spring keeper
3. Cover cork washer
4. Lower cover
5. Cover screw washer
6. Cover spring
7. Spring retainer
8. Upper cover

Pushrods must seat in the tappet screw and pushrod sockets.

4. Insert the oil line in the head and crankcase fittings.

5. Secure the cylinder bolts in the same manner as the rocker cover bolts and torque them to 65 ft lbs.

6. Position the rubber, oil line nut sleeves and secure the nuts.

7. Install the intake manifold and replace the rubber O-rings before installing the carburetor. Correct alignment of these units is critical as air leaks adversely affect performance. The cylinder may have to be shifted slightly to provide proper manifold alignment.

8. Adjust the tappets as described in "Valve Tappet Adjustment."

9. Assemble the remaining parts in the reverse order of disassembly.

GLIDE MODELS

Removal

1-7. Same as for Sportster. Follow Steps 1-9 in "Engine Removal" section.

8. Remove the head bolts and washers from beneath the cooling fins.

8-9. Same as for Sportster.

Disassembly

1. Remove the cylinder head stud nuts and rocker arm cover.

2. Consult Sportster "Cylinder Head Disassembly" for additional procedures.

Inspection

1. Consult Sportster "Cylinder Head Inspection."

2. Bearing faces, with dowel pins removed, may be sanded with emery cloth to reduce clearances. A suitable reamer (such as Reamer HD Part No. 94804-57) may be used to line-ream the bearing.

3. Gently strike the edges of the bearings, while assembled, to align parts before the checking fit.

4. Continually sand, clean, check clearances, and repeat until the desired fit is obtained.

Assembly and Installation

Assemble in reverse order of disassembly. Note the following:

1. Assemble the valve assemblies as described in Sportster "Cylinder Head Assembly."

2. If the rocker arm is not free, the lifters will not fill with oil.

3. Replace rocker arm cover using aluminum paint on the cover faces, unless the model is equipped with a gasket as on 1971 and later models.

4. Raise the valve end with a screwdriver when the cover is installed to prevent rocker arm jamming on 1966 and later models.

5. See Sportster "Cylinder Head Installation" for torquing and carburetor assembly procedures.

6. Adjust the tappets as described in "Valve Tappet Adjustment."

7. Assemble remaining parts in reverse order of disassembly.

VALVE GUIDES AND SEATS

Replacement Valve Guides

SPORTSTER

1. Valve guide clearance must be within 0.003-0.005 in. Guides must be replaced if play exceeds 0.002 in.

2. Using a shouldered drift or an arbor press, remove the valve guides from the valve head side.

3. Carefully tap the new guide squarely into place and ream it with a suitable reamer to remove any possible high spots.

4. Ream the guides, with a $\frac{5}{16}$ in. reamer for the exhaust guides, and a $\frac{11}{32}$ in. reamer for the intake guides, to assure a smooth and perfectly round fit. 1972 and later models require Valve Guide Reamer (H-D Part No. 94830-47) or another suitable reamer.

GLIDE MODELS

1. Same as Steps 1-3 for the Sportster.

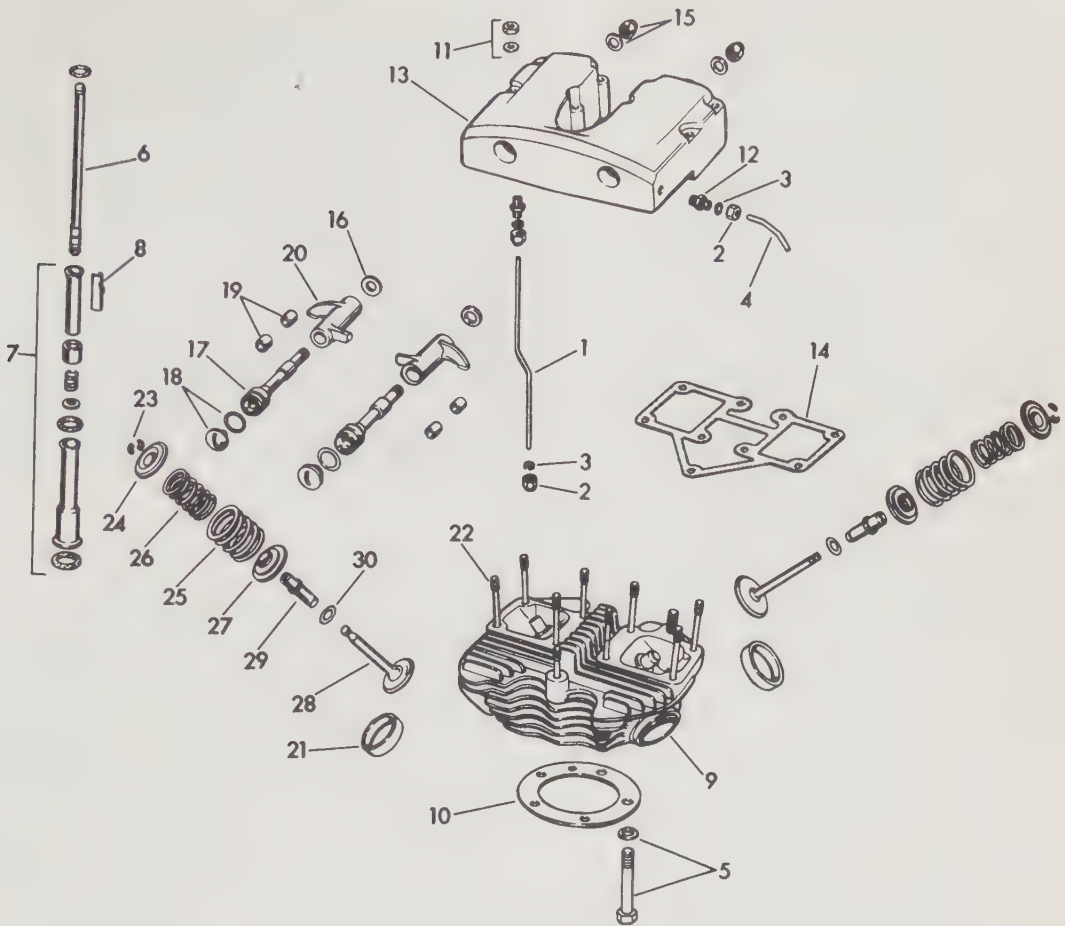
2. Exhaust valve guide clearance must be within 0.004-0.006 in. Intake valve guide clearance must be within 0.002-0.004 in. Guides must be replaced when play exceeds 0.002 in.

3. Oversize guides are available in 0.001-0.006 in. oversizes.

4. Ream out the guides with Valve Guide Reamer (H-D Part No. 94830-47) or a suitable substitute.

VALVE SEATS

Cylinder heads may be returned to the factory to have new seats installed. Con-



Glide models cylinder head assembly

- | | |
|---|---|
| 1. Overhead oil feed line | 16. Rocker arm spacer (2) |
| 2. Feed line nut (3) | 17. Rocker arm shaft (2) |
| 3. Feed line rubber sleeve (3) | 18. Rocker arm shaft screw and O-ring (2 each) |
| 4. Cylinder interconnecting oil line | 19. Rocker arm bushing (4) |
| 5. Head bolt and washer (5) | 20. Rocker arm (2) |
| 6. Pushrod (2) | 21. Valve seat insert (one exhaust, one intake) |
| 7. Pushrod cover (2) | 22. Rocker housing stud (8) |
| 8. Spring cap retainer (2) | 23. Valve key (2) |
| 9. Cylinder head | 24. Upper valve spring collar (2) |
| 10. Cylinder head gasket | 25. Outer valve spring (2) |
| 11. Rocker housing nut and washer (5) | 26. Inner valve spring (2) |
| 12. Oil feed line nipple | 27. Lower spring collar (2) |
| 13. Rocker arm housing | 28. Valve (one exhaust, one intake) |
| 14. Rocker housing gasket | 29. Valve guide (one exhaust, one intake) |
| 15. Rocker arm shaft acorn nut and washer | 30. Valve guide gasket (2) |

sult your local dealer for additional information.

Refacing Valves and Seats

1. If the valve guides are to be replaced, do so before refacing the valves and seats.

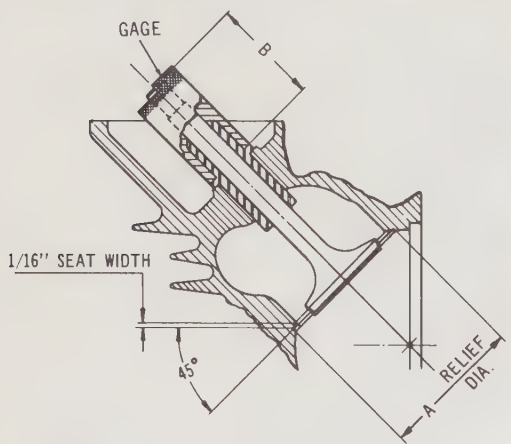
2. Use Valve Grinding Tool (H-D Part

No. 96550-36) or one of the many commercial grinding tools available.

3. Grind the seat to a 45 degree angle so that the seat is $\frac{1}{16}$ in. wide.

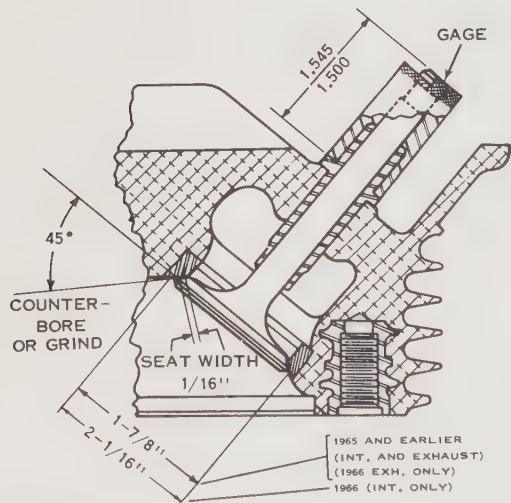
4. If the seat is wider than $\frac{1}{16}$ in., it may be narrowed by grinding the valve seat relief at a 15 degree angle.

5. Grind the valve to 45 degrees and only long enough to clean and true the



Model	Valve	Relief Dia. A	B	
			Max.	Min.
XL	Int.	1.75	1.420 (all)	1.375 (all)
	Exh.	1.62		
XLH	Int.	1.87		
	Exh.	1.62		

Sportster valve seat tolerances



Glide models valve seat tolerances

surface. Avoid excessive grinding. Replace the valve if it is excessively pitted or warped, or if it is sharp at the face edges.

6. The valve stem end may be turned on a grinding wheel.

Lapping Valves and Seats

1. After the valve faces and seats are ground, apply a light coat of fine lapping



Lapping valve faces and seats

compound and insert the valve in the guide.

2. Rotate the valve several times with a grinding tool while applying light pressure at the face and seat by pulling on the valve stem. This may also be done by hand. A good way is to put a piece of gas line over the stem and hold the head so the stem is up. Rotate it several times and then check as described below.

3. To check for a well-seated valve, clean the seat and face thoroughly and insert the valve. Apply light pressure to the seat and face, then pour some gasoline on the valve from the combustion chamber side. If it takes several seconds (10–15 is a good indication) before leakage occurs, lapping has been successful.

Cylinders and Pistons

DISASSEMBLY

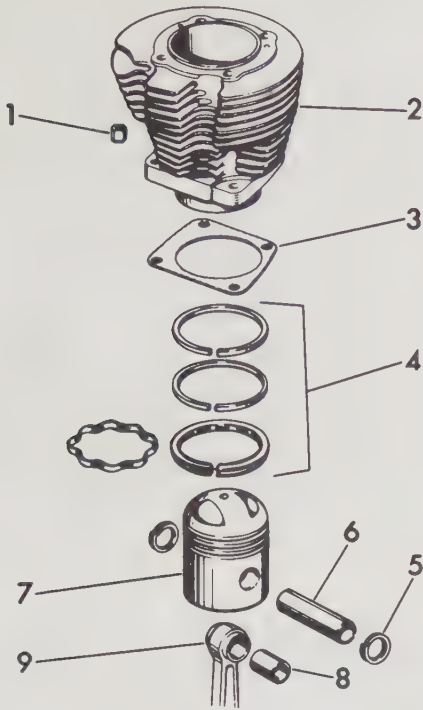
1. Strip the motorcycle as described in “Engine Removal” following Steps 1–6, 7, 20–22 (Sportster), and 1–9 (Glide).

2. Remove the cylinder head as described in “Cylinder Head Removal.”

3. Clean the crankcase thoroughly at the cylinder base.

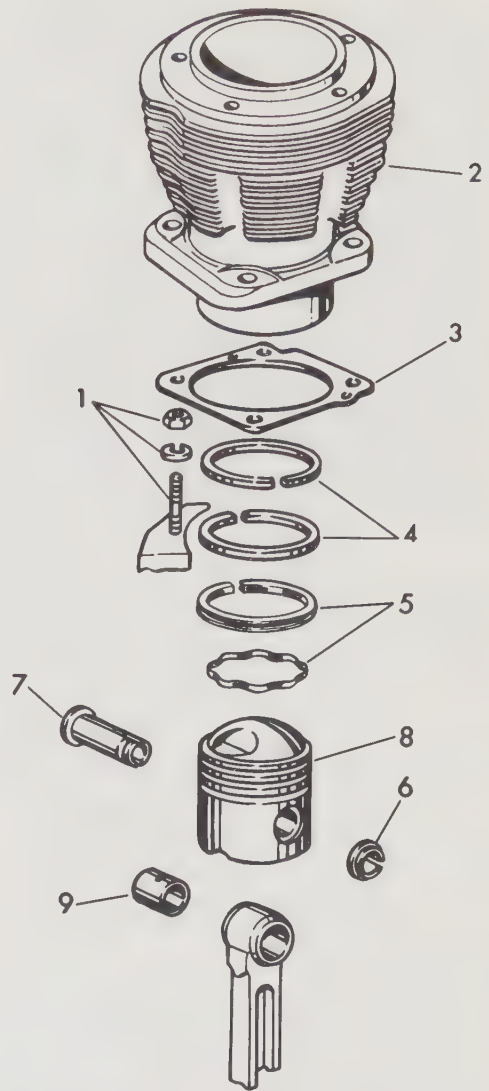
4. Remove the cylinder base nuts and raise the cylinder high enough to place a clean, oily rag over the crankcase to prevent foreign objects from falling in.

5. Rotate the engine until the piston



Sportster cylinder and piston assembly

- | | |
|---------------------------|-----------------------|
| 1. Cylinder base nut (4) | 6. Piston pin |
| 2. Cylinder | 7. Piston |
| 3. Cylinder base gasket | 8. Piston pin bushing |
| 4. Set piston rings | 9. Connecting rod |
| 5. Piston pin locking (2) | |



Glide models cylinder and piston assembly

- | |
|--|
| 1. Cylinder base stud nut and washer (4) |
| 2. Cylinder |
| 3. Cylinder base gasket |
| 4. Piston rings (2 compression) |
| 5. Oil control piston ring and expander spring |
| 6. Piston pin locking (2) |
| 7. Piston |
| 8. Piston |
| 9. Piston pin bushing |

is at its lowest point and lift the cylinder free.

6. Discard the cylinder base gasket.

7. Remove the cylinder compression rings with a ring expander. Rings can also be removed by prying one end free and blocking the other end or by pulling both ends free of the piston. If the rings will not clear the piston completely, work them off slowly, taking care not to scratch or nick the piston surface. Once removed, rings should be replaced.

8. Pry the piston pin circlips free and discard them. Glide models have a lipped piston pin lock ring.

9. Push out the piston pin from the piston until it can be removed. Mark the pistons for reassembly in the original cylinders.

10. Remove the piston pin bushing, if necessary, using Piston Pin Bushing Tool (H-D Part No. 95970-32A), and Connecting Rod Clamping Tool (H-D Part No. 95952-33) or remove the connecting rod and support the rod around piston bore

then drift it free. Consult "Connecting Rod Small End Bushing Removal and Replacement."

INSPECTION

1. Clean the cylinders and pistons in a suitable solvent until carbon deposits begin to flake off. Scrub with a wire brush if necessary.

2. Clean all parts in a suitable solvent and blow them dry. The piston ring grooves may be cleaned with a piece of old ring.

3. Inspect the piston pin and pin bushing for a pitted, scored, or loose condition and replace if necessary. Pins are a hand-press fit with about 0.001 in. clearance. If the pin and pin bushing fit is more than 0.002 in. loose, replace worn parts as described.

On Sportsters, the front rod must have no more than $\frac{11}{64}$ in. axial or radial play and no more than $\frac{3}{64}$ in. for the rear before lower bearing replacement is indicated.

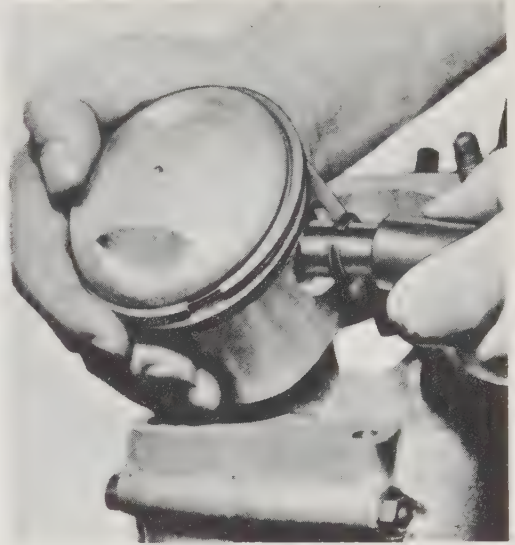
CYLINDER BORE REFINISHING (ALL MODELS)

1. Measure cylinder bore by taking measurements from front to rear and side to side with an inside micrometer at both $\frac{1}{2}$ in. from the top of the cylinder. Repeat at the bottom of ring travel to determine cylinder roundness.

2. Measure piston diameter perpendicular to the wrist pin at the base of the piston skirt to check for roundness.

3. Subtract the piston diameter from the cylinder bore to arrive at a clearance measurement.

4. Refinishing is necessary if the cyl-



Installing piston pin circlip (1972 and earlier Glide models)



Measuring piston diameter



Installing cylinder using piston ring compressor

inders are scuffed, scored, or worn greater than 0.002 in.

5. Oversize pistons can be used to take up excessive clearance when cylinder wear is greater than 0.002 in.

6. If wear exceeds 0.002 in., the cylinders must be bored to the next standard oversize and fitted with suitable pistons and rings.

7. Oversized pistons and rings are available in 0.005, 0.010, 0.020, 0.030, 0.040, 0.050, 0.060, and 0.070 in. oversizes.

8. When it becomes necessary to exceed the 0.070 in. oversize, new cylinders are required.

9. Pistons may be used over again if the cylinders are not worn in excess of

0.002 in. and if damage does not make boring necessary. Replace the rings and rough up the cylinder walls with no. 150 carborundum emery cloth.

10. Refinish the cylinders with a hone or boring bar, and then with a finishing hone. If the cylinders are not badly scored or worn, a hone alone should suffice.

11. Bore to slightly less than the nearest oversize if badly worn or scored, and then finish with a hone to the exact size.

PISTON RING ASSEMBLY

1. Replace the rings even if the same pistons are to be used.

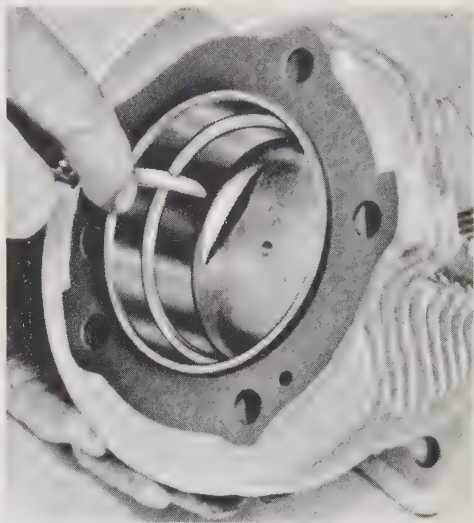
2. Rough up the cylinder walls with carborundum emery cloth to facilitate ring seating.

3. The top two ring grooves are for the compression rings. The lowest groove is for the oil control ring.

4. Consult "Engine Specifications" for ring and piston fit and gap specifications.

5. Ring gap is determined with the piston crown $\frac{1}{2}$ in. from the top of the cylinder. Lay the ring to be checked on top of the piston and check the gap with a feeler gauge.

6. Use standard size pistons and rings in standard bores or match oversize rings and pistons in oversized bores. Oversized rings are available in 0.010 in. gradations from 0.010–0.070 in. Regardless



Measuring ring gap

of the oversize, the proper gap is the standard gap. A smaller gap may cause ring failure. If necessary, increase gap with a fine-cut file.

7. Using a ring expander, slip the oil ring in place and then the two compression rings. Rings are fit with the chamfered or dotted side up.

8. Stagger ring gaps 120° before assembling the piston in the cylinder.

CONNECTING ROD SMALL END BUSHING REPLACEMENT

1. Bushings are a hand-press fit and must be tight in the rod.

2. If the pin clearance exceeds 0.002 in., there are two possible methods of correction:

a. Ream the bushing oversize and use an oversize pin.

b. Install a new bushing and ream it to fit a standard pin. This is the preferred method.

3. Remove bushings by either of the following methods:

a. Remove the rod and support it around the bushing bore then drift the bushing free.

b. Assemble Piston Pin Bushing Tool (H-D Part No. 95970-32) and Connecting Rod Clamping Fixture (H-D Part No. 95952-33), and drive the bushing free.

4. Replace the bushings with the oil slot aligned with the rod oil slot.

5. Using Reamer (H-D Part No. 94800-26) or a suitable replacement, ream the



Measuring ring side clearance

bushing to size, or ream it nearly to size and finish with a hone. This is the preferred method.

6. The bushing should now afford 0.001 in. pin clearance.

ASSEMBLY

Assemble in reverse order of disassembly. Note the following:

1. Rings should be replaced if they have been removed. Gaps must be staggered 120° around the piston. Fit with the chamfered or dotted side up.

2. Install the pistons so that the piston boss web is to the right-side of engine or in the original position. The web is a small ridge underneath the piston.

3. On 1972 and earlier Glide models, install the locking ring on the end of the piston pin that is not slotted. Preheat the piston in boiling water and starting from the left-side, drive the pin into position. When the pin is in place, install the remaining lockring on the piston pin using the special tool (H-D Part No. 96780-32A).

On Sportster and 1973 and later Glide models, position the piston pin in the connecting rod (thru piston) and install

the locking on the piston pin using the special tool (H-D Part No. 96780-58A).

The use of new circlips is recommended.

4. Lubricate the cylinder walls, pistons, pins, and bushings.

5. Assemble the cylinder using a ring compressing device if so desired.

Valve Tappets and Tappet Guides

SPORTSTER

Removal

NOTE: Consult the "Timing Gear" section for a tappet assembly illustration.

1. Remove the tappet guide screw and tappet adjusting screw.

2. Remove the tappet guide with Tappet Guide Puller (H-D 95724-57) or a suitable gear puller. Cam gears must be in place during this operation or damage to the camshaft bushings will result.

3. Remove the tappet guide O-ring, tappet body, and the tappet and roller assembly.

4. Mark the tappet assemblies for reassembly in their correct locations.

Installation

Assemble in reverse order of disassembly. Note the following:

1. Lightly lubricate the tappet assembly with engine oil before assembly.

2. The roller must seat correctly on the cam and in the guide.

3. Block up the tappet, at its limit of travel, to keep it from falling into the crankcase during installation.

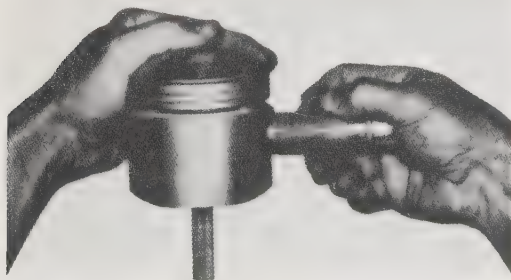
4. Place the O-ring and guide gasket on the guide.

5. Turn the adjusting screw and nut into the tappet and insert the tappet in the guide.

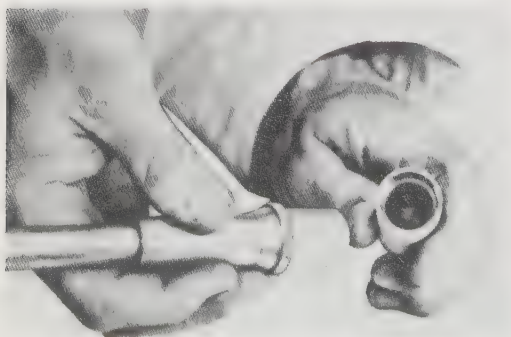
6. With the guide screw holes aligned, insert the guide into the crankcase and tap gently with a soft mallet until the guide is seated.

7. Secure the assembly and recheck for free tappet movement.

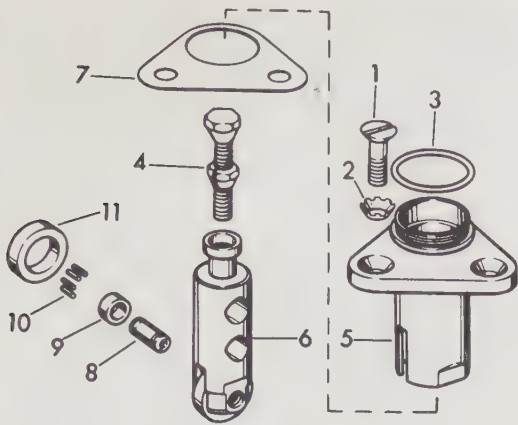
8. Adjust the tappets as described in "Valve Tappet Adjustment."



Installing piston pin lock ring (Sportster and 1973 and later Glide models)



Inserting piston pin lock ring in special tool (Sportster and 1973 and later Glide models)



Tappet assembly (Sportster)

1. Tappet guide screw (2)
2. Tappet guide screw lockwasher (2)
3. Valve cover guide gasket
4. Tappet screw with nut
5. Tappet guide
6. Tappet
7. Tappet guide gasket
8. Roller pin
9. Roller race
10. Needle rollers (25 small or 20 large)
11. Roller

GLIDE MODELS

The Glide models have hydraulic tappets which operate under compression force from the valve springs. The tappet roller follows the surface of the cam as do the mechanical units.

The hydraulic unit contains a piston, cylinder, and a ball check valve which maintains a self-adjusting, no-play condition through the valve train.

Clicking noises are to be expected until normal operating temperature is reached. A correctly functioning unit should then become quiet.

Disassembly

1. Remove the pushrod cover spring cap retainer and telescope the covers if the cylinder head is still assembled.

2. Back off the pushrod adjusting screw until the rod can be lifted free of the ball socket.

3. Remove the tappet guide screws and hydraulic units.

4. Gently tap the guides with a soft mallet to loosen them. The tappets and guides can be removed together by pressing the tappet tops against the guide sides with thumb and forefinger, and then by lifting them clear. Do not allow

the tappets to fall into the gearcase through the tappet guide mounting holes.

5. Remove the pushrod cork washers from the guides.

6. Remove the tappet from the bottom of the guide.

7. Remove the guide gasket.

Inspection

1. Clean all parts except the gaskets and hydraulic units in a suitable solvent and blow dry. Do not mix parts.

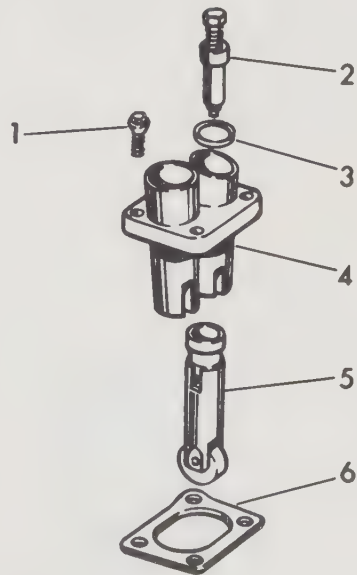
2. Remove the hydraulic piston and spring from the cylinder, wash them in a suitable solution, and blow them dry.

3. Clear all of the oil passages with compressed air or a piece of wire.

4. Inspect all parts for a worn or damaged condition and replace where necessary.

5. Inspect the cam condition through the gearcase guide ports.

6. Replace the entire tappet as a rule, but roller assemblies only may be replaced, if necessary, by drilling or pressing out the roller pin and installing a roller replacement kit. Rollers should have



Tappet assembly (Glide models)

1. Tappet guide screw (4)
2. Pushrod hydraulic unit (2)
3. Pushrod cover cork washer (2)
4. Tappet guide
5. Tappet and roller assembly (2)
6. Tappet guide gasket

Figure following name of part indicates quantity necessary for one complete assembly

0.0005–0.001 in. play on the bearings and about 0.008 in. sideplay.

7. Replace worn parts if the tappet fit in the guide exceeds 0.001 in.

8. The guide is press-fit into the crankcase and must be replaced if play exceeds 0.0005–0.001 in.

9. If the tappet adjusting screw is worn hollow due to pushrod action, it must be replaced to ensure accurate adjustment.

10. Replace the rubber O-rings and gaskets if necessary.

Checking Pushrod Operation

1. Check to make sure that the ball valve and seat are clean and dry.

2. Insert the piston in the cylinder.

3. Holding the piston in a vertical position, press down until the spring begins to seat on the cylinder. The cylinder base hole should not be covered.

4. Maintain this pressure for six seconds and then release. The piston should bounce back.

5. If the piston fails to return, repeat Steps 3 and 4 while covering the hole. If the piston does not bounce back, replace the unit. If the piston does bounce back, the ball is not seating and the unit must be replaced.

6. Check for a clogged oil screen beneath the large cap screw near the rear

tappet guide before replacing the units. If the tappet operates correctly without the screen in place, the problem was not in the hydraulic units. Consult "Gearcase Disassembly" for screen removal procedures.

Assembly

Assemble in reverse order of disassembly. Note the following:

1. Insert the tappets into the guides so that the flat surfaces with oil holes are toward the center of the guide.

2. Place a dry guide gasket in position and insert the guide into the gearcase while holding the tappets with the thumb and forefinger. Secure the guide screws.

3. Assemble the cork washers and hydraulic units.

4. Adjust the tappets as described in "Valve Tappet Adjustment."

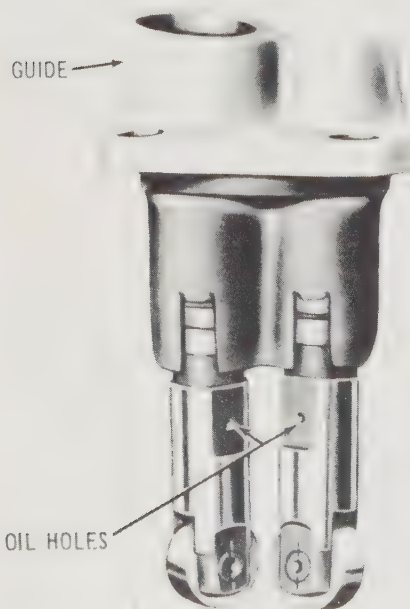
Clutch

GLIDE MODELS

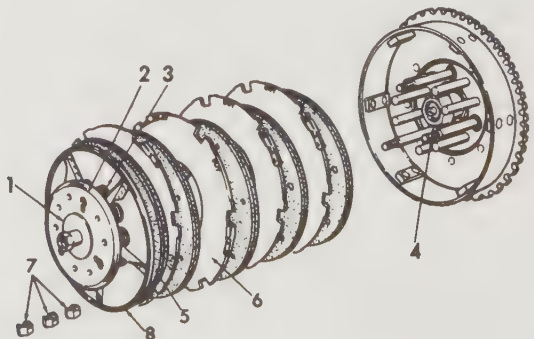
Disassembly

1. Remove the chainguard and tensioner screw.

2. Remove the pushrod adjusting screw locknut and place a $\frac{1}{8}$ in. thick washer of $1\frac{3}{4}$ in. diameter, with a $\frac{3}{8}$ in. hole, over the adjusting screw.



Assembling tappets in guides (Glide models)



Removing clutch plates (Glide models)

1. Flat washer
2. Spring collar
3. Spring
4. Clutch hub nut
5. Friction discs (5)
6. Steel discs (4)
7. Spring tension adjusting nuts (3)
8. Outer disc

3. Secure it with a locknut and tighten until the spring guide stud nuts are free.

4. Remove the stud nuts and slip out the releasing disc, springs, pressure plate, adjusting screw, and adjusting screw locknut as an assembly.

5. Slide out the friction and steel discs.

6. Loosen the starter motor to provide clearance for removing the clutch sprocket and chain.

7. Remove the engine sprocket nut with Sprocket Nut Wrench (H-D Part No. 94545-26) or a suitable substitute and pull the sprocket off the shaft. A 1.0 in. socket can also be used.

8. Lift the primary chain so that it is free from the clutch sprocket and remove the clutch sprocket.

9. Remove the clutch gear nut and washer using H-D Clutch Hub Nut Wrench, Part No. 94645-41. This nut has a left-hand thread, and the tool is best used in conjunction with a soft mallet. Any socket which fits the nut properly can also be used.

10. Pull the clutch hub with Claw Puller (H-D Part No. 95960-41A). Most small gear pullers will also work.

11. Remove the bearing plate springs from the hub pins.

12. Remove the bearing retainer from the hub.

Inspection

1. Clean all parts in a suitable solvent and blow them dry.

2. Examine all parts for wear and replace any friction disc linings that are glazed, grooved, worn down to the rivets, oil-impregnated, cracked or chipped.

3. Glazed friction discs can sometimes be salvaged by soaking them in white gas for several hours and roughing them with a medium grade sandpaper. Make certain that all traces of gas are removed before reinstalling. This is not a recommended practice but will serve temporarily.

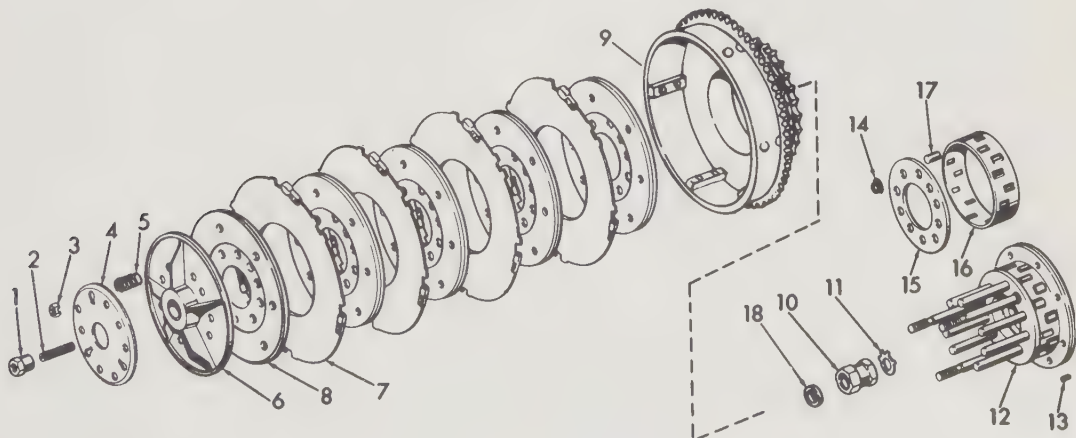
4. Steel discs can be reused unless they are burned or grooved, or if buffer balls do not snap back when depressed.

5. Replace the clutch hub roller bearing if, after cleaning and repacking, it sticks or fails to revolve smoothly.

6. Clutch springs may be tested for compression with the Valve Spring Tester, Part No. 96797-47 or an automotive tester. 1967 and earlier models have springs whose free length is $1\frac{31}{64}$ in. and compress to 42-52 lbs at $1\frac{1}{8}$ in. 1968 and later models have a free length of $1\frac{45}{64}$ in. and compress to 30-38 lbs. at $1\frac{1}{4}$ in. Springs not meeting these specifications should be replaced.

Assembly

1. Assemble the springs on the releasing disc and place the pressure plate



Clutch assembly (Glide models)

1. Pushrod adjusting screw locknut
2. Adjusting screw
3. Spring tension adjusting nut (3)
4. Spring collar
5. Spring (10)
6. Outer disc (pressure plate)

7. Steel disc (4)
8. Friction disc (5)
9. Clutch shell
10. Clutch hub nut
11. Hub nut lockwasher
12. Clutch hub

13. Clutch hub key
14. Bearing plate spring (3)
15. Bearing plate
16. Bearing retainer
17. Bearing roller
18. Bearing nut seal

on them, taking care to seat each spring properly.

2. Turn the pushrod adjusting screw into the releasing disc.

3. Lay the washer, as described in "Clutch Disassembly," loosely over the adjusting screw and secure it with the pushrod adjusting screw locknut.

4. Before securing the locknut, check spring alignment and correct if necessary, using a $\frac{3}{8}$ in. rod as an aligning tool.

5. Place the hub on the gear shaft with the splines engaged, and secure it with the lockwasher and gear nut. Set the washer in one of the nut's slots with a punch.

6. Slide the clutch sprocket and key ring on the hub.

7. Light grease the ball bearings.

8. Slide the clutch discs on in the order shown in the illustration. The disc which is closest to the hub should be a friction disc, then a steel disc, and so on with buffers staggered in different spline ways. Steel discs are installed with the "out" stamp facing out.

9. Slip the releasing assembly on the hub studs, and secure it with the spring guide stud nuts as described in "Clutch Spring Adjustment."

10. When reassembling, the back of the pressure plate to the front of the clutch releasing disc is $\frac{31}{32}$ in. for 1967 and earlier models, and $\frac{11}{32}$ in. for 1968 and later models.

11. Adjust the clutch control and release lever.

Release Bearing Removal

NOTE: Consult starters section for illustrations of Glide Model release bearings.

1. Remove the clutch control cable from the clutch release lever.

2. Remove the sprocket cover securing nuts and washers.

3. Remove the transmission oil filler plug. This will come loose more easily when the engine is warm.

4. Remove the sprocket cover and clutch release lever together by prying or tapping them gently with a soft mallet to free the cover from the studs.

5. Remove the clutch release bearing and pushrod from the transmission shaft.

Release Bearing Inspection

1. Clean all parts in a suitable solvent and blow them dry.

2. If excessive play is present in the release bearing, the pushrod will wear rapidly. Replace as a unit if it is worn. A bad bearing will cause grinding and whirring noises when the clutch is released.

Release Bearing Installation

1. Repack the bearing liberally with grease.

2. Insert the pushrod and bearing into the transmission shaft hole as a unit.

3. Install and secure the sprocket cover.

4. Connect the clutch control cable.

5. Adjust the cable mechanism.

Clutch Control Cable and Housing Replacement

1. Remove the kick-start lever, front cylinder exhaust pipe and muffler, right footrest, and transmission sprocket cover bolts.

2. Loosen the adjusting screw locknut and back off the adjusting screw.

3. Lightly tap the cover with a soft mallet while working it free of the kick-starter shaft.

4. If only the cable is to be replaced, the end may be cut at the lever and the cable may be withdrawn through the top of the housing after being freed from the hand lever.

5. Push the worm lever forward until about 1 in. of cable remains in the cover.

6. The housing will come free by pressing it in and down toward the oil pump.

7. Remove the housing from the left front frame, and lift the ferrule free at the hand lever. This will free both the cable and housing for removal.

8. A new housing should be about $47\frac{3}{4}$ in. long for use with "Speedster" bars, and about $51\frac{1}{16}$ in. long for "Buckhorn" bars.

9. Before installing the upper and lower ferrules, the housing should be stripped of $\frac{5}{8}$ in. upper end insulation, and $1\frac{1}{4}$ in. from the lower end.

10. Slip an oiler into place after removing $\frac{1}{4}$ in. of insulation from the housing at a point 7 in. from the hand lever.

11. Lubricate the new cable while inserting it in the housing from the upper end.

12. Secure the ferrule in the hand lever, with the pin slot-facing in, or the open end facing down on the older, slotted-end types.

13. Slip the felt seal retainer and seal on the cable bottom, and secure them with the cable end pieces.

14. Secure the cable end with hard solder after spreading some strands in the fitting countersunk hole.

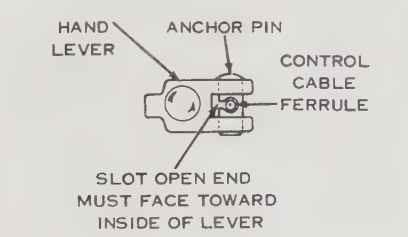
15. Assemble the remaining parts in reverse order, taking care to properly seat gaskets, replace oil, and adjust the release mechanism.

SPORTSTER

Release Mechanism

DISASSEMBLY

1. Follow Steps 1-4 in the "Clutch Control Cable and Housing Replacement" section.



2. Remove the worm and lever spring, adjusting screw locknut, adjusting screw, and worm dust cover.

3. Remove all clutch parts labeled 1-10 in the illustration to remove the clutch release rods.

4. The left clutch release rod will slip out and the other three must be drifted out from the clutch side.

5. The roll pin is a press-fit and should not be removed.

INSPECTION

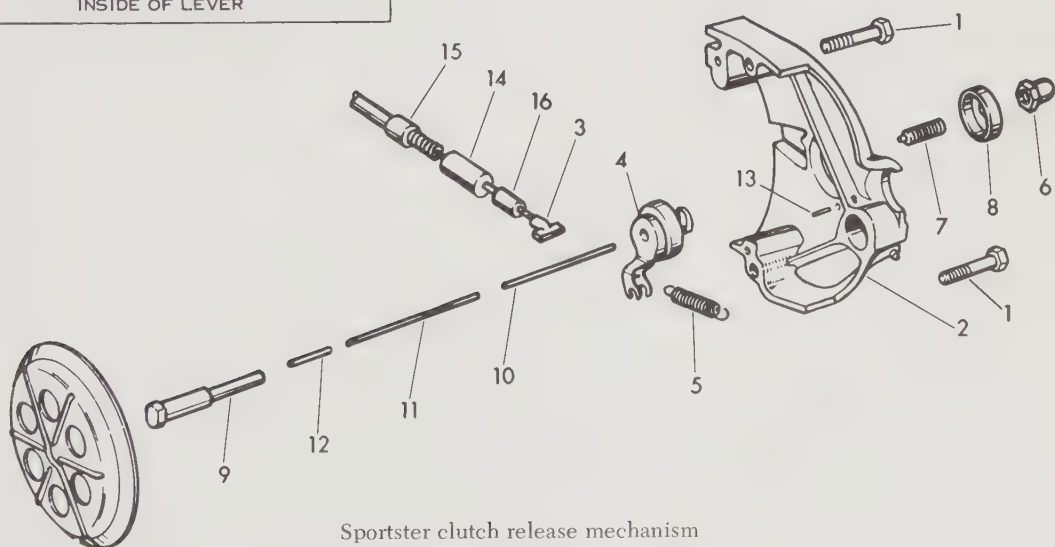
1. Clean all parts with a suitable solvent and blow dry.

2. Inspect the worm for wear and replace if necessary. Excessive wear will cause clutch drag.

3. Examine the fit of the lever fingers with cable end, and replace if not firm.

4. The correct length of the lever spring is $1\frac{25}{32}$ in. and must be replaced if worn or damaged.

5. Examine the tips of the clutch release rods for wear, roll the rods on a flat



Sportster clutch release mechanism

1. Sprocket cover bolt (2)

2. Sprocket cover

3. Control cable end

4. Clutch release worm and lever

5. Clutch release worm and lever spring

6. Clutch adjusting screw locknut

7. Clutch adjusting screw

8. Clutch release worm cover

9. Clutch release rod—left

10. Clutch release rod—right

11. Clutch release rod—right center

12. Clutch release rod—left center

13. Sprocket cover roll pin

14. Clutch cable felt seal retainer

15. Clutch cable ferrule (2)

16. Clutch cable felt seal

surface to check for warping, and replace if necessary.

ASSEMBLY

Assemble in reverse order of disassembly. Note the following:

1. Dip the rod ends in oil before installing.

2. Slip in the left release rod from the clutch gear end, and slip in the left center, right center, and right release rods from the sprocket side.

3. Assemble clutch parts 10-1 (see illustration) as described in the "Clutch Assembly" section.

4. Assemble the worm, spring, cover, adjusting screw, and locknut to the sprocket cover and check for smooth movement.

5. Place the cover on the starter shaft and engage the cable end with the lever; secure the cover.

6. Lubricate the worm with a suitable grease through the worm fitting.

7. Check the motion of the worm and be sure it seats against the roll pins.

8. Install the remaining parts as described in "Clutch Cable and Release Mechanism Adjustment."

9. Adjust the clutch release mechanism.

1970 and Earlier Clutch Disassembly

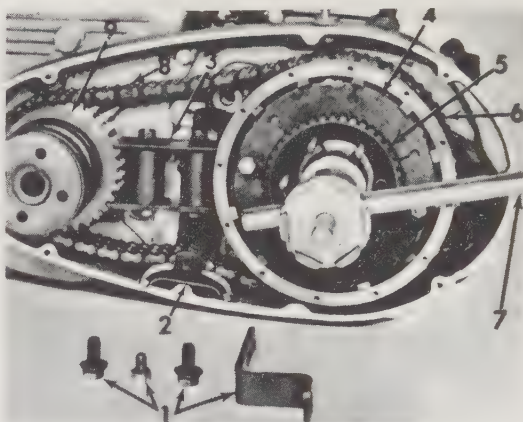
1. Remove the chain and clutch covers, and all associated hardware.

2. Remove the hub stud nuts, spring-tension adjusting plate, spring cups, and releasing disc.

3. Slide out the 14 clutch plates and backing plate by tipping the engine or lifting them out with a hooked piece of wire.

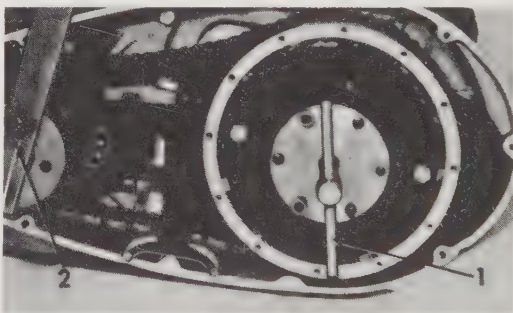
4. Remove the primary chain adjuster brace capscrews and brace.

5. Use a Sprocket Locking Link Tool (H-D Part No. 97200-55), if available, to prevent the clutch and compensating sprocket from turning while pulling the hub. A wooden door stop wedged in below the compensating sprocket or a



Clutch hub nut removal

1. Front chain adjuster brace and capscrews
2. Front chain adjuster
3. Sprocket locking link tool
4. Clutch lockplate
5. Clutch hub
6. Clutch shell
7. Clutch hub nut wrench
8. Front chain
9. Compensating sprocket



Removing clutch hub

1. Clutch hub puller
2. Compensating sprocket shaft wrench

suitable air impact driver are alternatives which will also work.

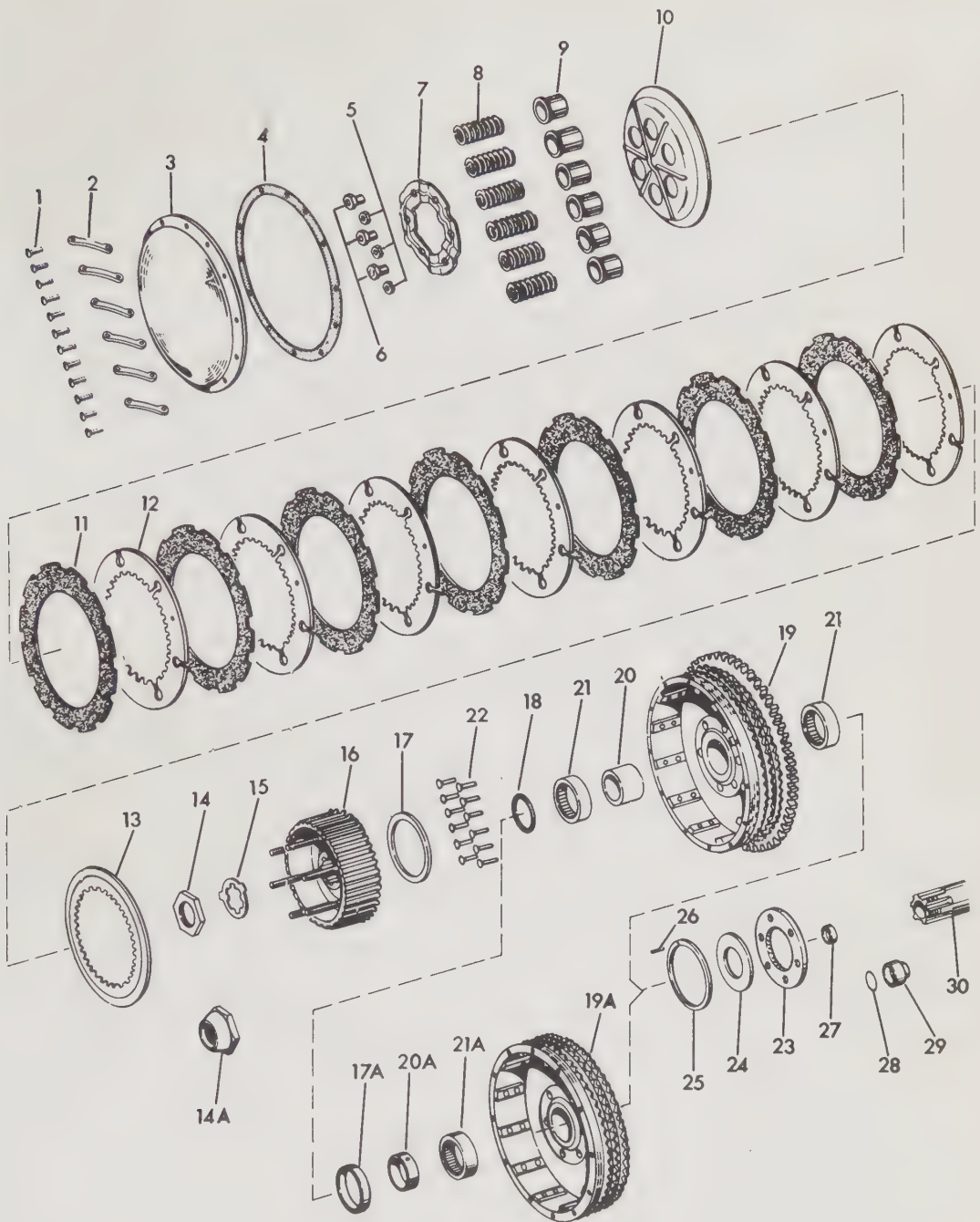
6. Bend the ears of the hub nut lockwasher away from the hub and remove the left release rod.

7. Using a Clutch Lock Plate (H-D Part No. 97175-55) and a Hub Wrench (H-D Part No. 94647-52), remove the clutch hub nut. An old steel clutch plate can be drilled out to substitute for the

1. Clutch cover screw (12)
2. Clutch cover screw retainer (6)
3. Clutch cover
4. Clutch cover gasket
5. Hub stud nut (3)

6. Hub stud nut—long (3)
7. Pressure plate
8. Clutch spring (6)
9. Backing plate cup (6)
10. Releasing disc

11. Friction drive plate (7)
12. Driven plate (7)
13. Backing plate
14. Hub nut (1967 XLH)
- 14A. Hub nut (1966 and earlier)



Clutch assembly

- | | | |
|---|---|---|
| 15. Hub nut lockwasher | 21. Needle bearing (2—1967 XLH) | 26. Sprocket hub washer pin |
| 16. Clutch hub assembly | 21A. Needle bearing (1—1966 and earlier) | 27. Clutch gear (pushrod) oil seal |
| 17. Clutch hub oil seal (1967 XLH) | 22. Sprocket rivet (12) | 28. Clutch gear extension O-ring (1966 and earlier) |
| 17A. Clutch hub oil seal (1966 and earlier) | 23. Starter clutch | 29. Clutch gear extension (1966 and earlier) |
| 18. Clutch hub O-ring (1967 XLH) | 24. Sprocket bearing washer (variable-size) | 30. Clutch gear |
| 19. Clutch shell (1967 XLH) | 25. Sprocket hub washer | |
| 19A. Clutch shell (1966 and earlier) | | |
| 20. Clutch hub spacer (1967 XLH) | | |
| 20A. Clutch hub spacer (1966 and earlier) | | |

Figure following name of part indicates quantity necessary for one complete assembly.

Note: 1966 and earlier parts also used for 1967 XLCH.

lockplate and an appropriate size socket can be used instead of the hub wrench.

8. Pry the hub nut lockwasher free and discard it.

9. Pry the oil seal free from the clutch gear end.

10. Remove the clutch hub from the clutch gear splines with a Hub Puller (H-D Part No. 95960-52) or suitable gear puller.

11. On 1967 XLH models, remove the O-ring from its groove in the clutch gear.

12. Remove the gear shaft nut by using the Compensating Sprocket Shaft Wrench (H-D Part No. 94557-55), and remove the clutch shell, primary chain, and engine sprocket. As an alternative method, punches can be inserted in the sprocket holes, and levered with a screwdriver.

13. Remove the clutch hub spacer.

14. Remove the clutch gear extension and O-ring by tapping it with a soft mallet. This applies only to 1966 and earlier models.

INSPECTION

1. Inspect the clutch cover for damage which might cause leaks and use a new gasket for reassembly.

2. New springs have a free-length of $1\frac{1}{8}$ in. and if any spring is too short, damaged from heat, or worn, the set should be replaced.

3. Inspect the clutch release disc for grooves, excessive wear, or a warped condition, and replace if necessary.

4. Inspect the clutch friction plates for wear, grooves, or oil saturation. If the plates are worn but not oily, they may be cleaned with medium grade sandpaper. Replace plates if no mark is left after pressing a thumb nail on the cork surface.

5. Driven clutch plates can be reused if they are only slightly discolored but they must still be smooth.

6. Replace the hub nut lockwasher.

7. Inspect the clutch hub spacer and needle bearing for excessive play and wear. Replace the spacer, if necessary, and consult "Clutch Shell Needle Bearing and Starter Clutch Replacement" if the bearing must be replaced.

8. Carefully pry the oil seal from the clutch sprocket and expand it to check for wear or damage. Replace if in doubt or if hairline cracks are present.

9. Examine and replace the clutch shell if excessive wear, grooving, worn or loose keys, worn or broken teeth, loose rivets, or a damaged sealing surface is present.

10. Loose rivets can be replaced if this is the only fault. Set the rivets until they are flush to 0.010 in. above the starter clutch face or 0.080 in. between the rivet head and bottom of the sprocket tooth for key securing rivets. Seal both sides with a solvent-proof sealer.

11. Inspect the starter clutch teeth for wear or damage, and consult the "Clutch Sprocket Needle Bearing and Starter Clutch" section for replacement procedures.

12. Inspect the clutch gear oil seal, by expanding the seal surface, and replace it if hair line cracks or other damage is present.

13. Replace the clutch hub rubber O-ring, if it is worn or damaged.

CLUTCH SPROCKET NEEDLE BEARING AND STARTER CLUTCH REPLACEMENT

1. Remove the oil seal and sprocket rivets to gain access to the clutch sprocket needle bearings, washers, and starter clutch. Bearings and the sprocket hub washer pin are a press-fit.

2. Replace the bearing by pressing from the inside on the bearing's printed side to a depth of 0.025–0.029 in. from the shell's inner face to the bearing's lip.

3. Press the roll pin until it extends 0.08 in. from the sprocket face.

4. On 1967 XLH models, the two bearings are pressed in the same way. The first seats to 1.010–0.015 in. from the shell to the bearing's inner face, the second is pressed from the starter clutch side until it is flush with the first.

5. Align the hub washer countersunk hole with the washer pin and mount the washer.

6. Insert the appropriate sized variable washer in the starter clutch.

7. With the starter clutch on the back plate, check clearance between the washer and the clutch with a feeler gauge. Exert pressure on the plate and try different washers until 0.001–0.0021 in. clearance is arrived at. Washers come in thicknesses which vary by .002 in.

8. Insert the rivets into the counter-

sunk holes from within the shell and set to 0.010 in. maximum above the clutch face. Seal both sides of the rivets with a solvent proof sealer.

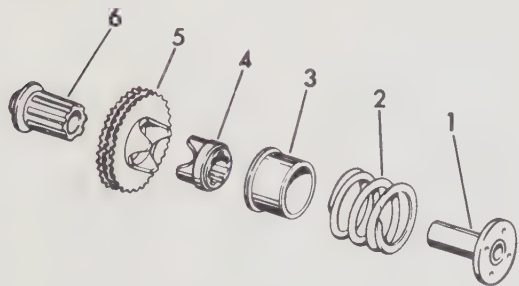
9. Press the hub oil seal in place with the lip facing into the shell.

COMPENSATING SPROCKET REMOVAL

1. Loosen the clutch shell and primary chain as described in "Clutch Disassembly."

2. Remove the sprocket shaft nut using Shaft Nut Wrench (H-D Part No. 94557-57) or a one-inch hex socket or wrench.

3. Slip the spring, sliding cam sleeve, sliding cam sprocket, and primary chain and clutch shell off shaft as an assembly. Use Sprocket Shaft Extension Puller (H-D Part No. 96015-56) or a suitable substitute to remove the shaft extension if desired.



Compensating sprocket assembly

1. Sprocket shaft nut
2. Sprocket spring
3. Sprocket sliding cam sleeve
4. Sprocket sliding cam
5. Engine sprocket
6. Sprocket shaft extension

INSPECTION

1. Clean all parts with a suitable solvent and blow them dry.

2. Inspect the sprocket teeth, shaft splines, and sliding surfaces for excessive wear or damage, and replace if necessary.

3. The cam and extension must be a matched set, so replace both or neither.

4. If the spring is damaged there will be primary chain noise even when the chain is properly tensioned. Replace it if this is the case.

INSTALLATION

1. Set the shaft extension with Sprocket Shaft Bearing Tool (H-D Part

No. 97081-54) as described in the "Crankcase Assembly" section. A socket can also be used as a drift.

2. Lightly grease the extension splines and assemble the sprocket, chain and clutch shell.

3. Slide on the sleeve, spring, shaft nut, and cam, taking care to align the splines.

4. Secure the clutch shell and sprocket shaft nut.

5. Assemble the chain cover and associated hardware.

1970 and Earlier Clutch Assembly

1. All parts must be clean, dry, and oil-free.

2. Lightly coat the release rod tips in oil and slide them into the clutch gear with the right rod first, then the right center, left center, and left rod last.

3. On 1966 and earlier models, press the gear extension into the clutch gear and seal it with aluminum paint.

4. Insert the hub nut O-ring and oil seal.

5. Lightly grease the needle roller bearings and compensating sprocket shaft extension.

6. Press-fit the roller bearing in the clutch shell.

7. Install the hub spacer and O-ring on the clutch gear.

8. Assemble the compensating sprocket as described in "Compensating Sprocket Assembly." The chain adjuster should be loose behind the chain.

9. With Clutch Hub Installing Tool (H-D Part No. 97170-55) install the hub on the gear splines. A socket can be used in conjunction with a soft mallet.

10. Install Locking Plate (H-D Part No. 9175-55) and lock the sprocket as described in "Clutch Disassembly" Step 5.

11. Slip a new lockwasher over the clutch gear splines and install the hub nut with an appropriate sized wrench or special Wrench (H-D Part No. 94647-52). Seat the nut to at least 150 ft lbs torque by striking the wrench handle with a soft mallet.

12. Bend the washer ear against the hub nut.

13. Check to make sure that the hub runs free on the shaft and check clearance between the starter clutch gear and

starter clutch as described in the "Starter Assembly" section.

14. Adjust the primary chain tension as described in the "Primary Chain Adjustment" section.

15. Remove the hub locking tools.

16. Install the backing plate against the back of the hub with the grooved side out.

17. Assemble the clutch plates starting with a steel plate, then a friction plate and so on. The last plate should be a friction plate and all should move freely.

18. Install the releasing plate on the hub with the studs centered in the cup holes. The larger of the two grooves on the rim should line up with the hub's notched tooth.

19. Assemble the cups, springs, and pressure plate with the raised surface facing out.

20. Place the $\frac{1}{2}$ in. long nut on the longer studs and tighten them evenly until the shorter studs are available. Start the $\frac{7}{16}$ in. nuts on their studs.

21. Tighten all six nuts evenly until the inside of the pressure plate is $\frac{3}{16}$ in. from the cup flanges. This is the proper distance for new clutch plates.

22. Assemble the new cover gasket with the graphite side facing out. Do not use sealer.

23. Assemble the clutch cover, screws, and screw retainers. Lightly stake the retainers to the screws.

24. Install a new chain cover gasket and apply sealer to both sides. Mount and secure the chain cover.

25. Mount and secure the rear brake pedal, stoplight switch, and footrest.

26. Prop up the motorcycle so it is straight and remove the oil filler cap and oil level plug. Fill with the recommended oil until overflow comes out of the oil level plug. When overflow stops, secure the plug and cap.

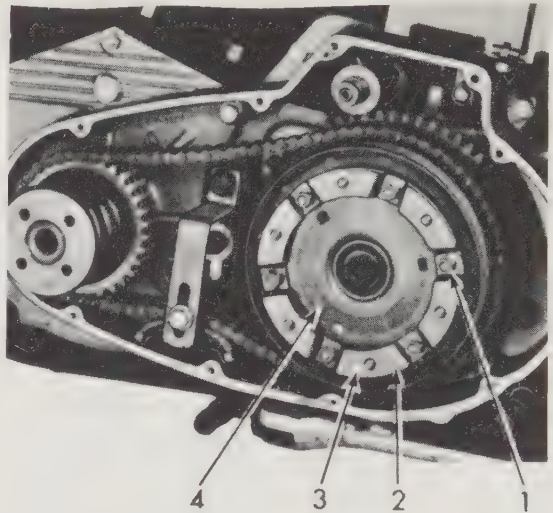
1971 and Later Clutch

DISASSEMBLY

1. Remove the chaincase cover as described in "Clutch Spring Adjustment."

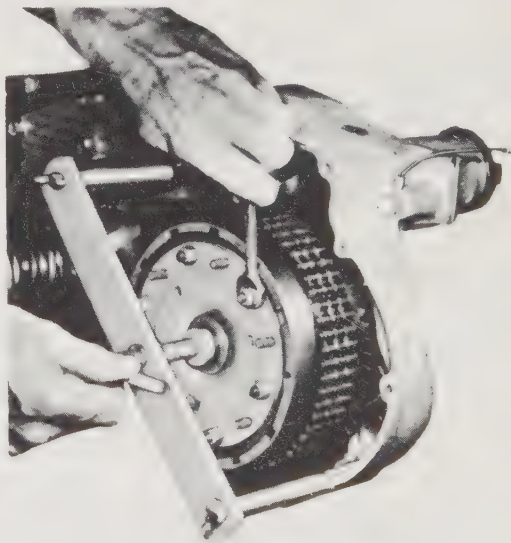
2. Remove the retainer nuts and retainer.

3. Install the Clutch Spring Compressing Tool (H-D Part No. 97178-71) if available. The new clutch has a center



Clutch retaining parts

1. Retainer nut (6)
2. Retainer (6)
3. Adjusting nut (beneath retainer) (6)
4. Clutch releasing disc

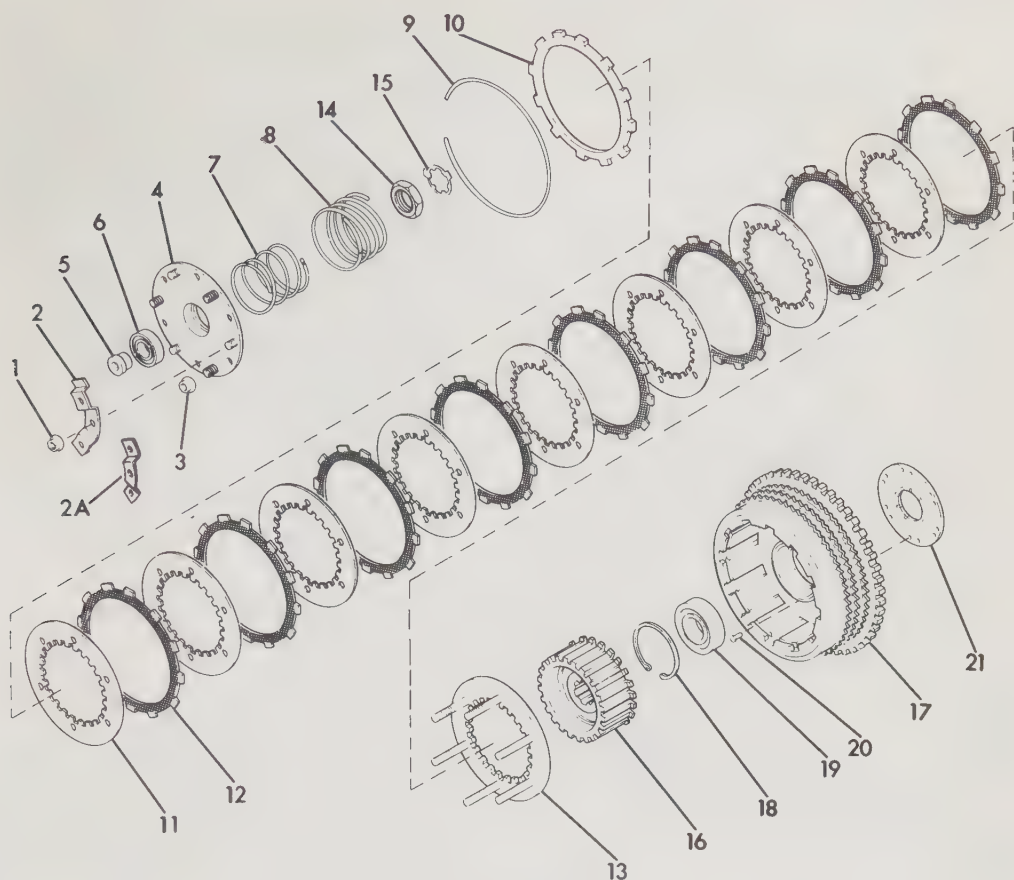


Compressing clutch spring

spring configuration rather than the traditional six springs. The pressure on the releasing disc won't bend the disc if the spring tension nuts are loosened diagonally, one turn at a time and then removed.

4. Remove the releasing disc, inner and outer springs, and Compressing Tool (if used).

5. Remove the retaining ring from the clutch shell groove and pull all of the clutch plates free as a unit by pulling on the pressure plate studs.



Clutch assembly

- | | |
|---|--|
| 1. Nut, retainer (3) (Early 1971) (6) (Late 1971) | 11. Driven plate (8) |
| 2. Retainer (3) (Early 1971) | 12. Drive plate (8) |
| 2A. Retainer (6) (Late 1971) | 13. Pressure plate |
| 3. Nut, spring tension (6) | 14. Hub nut |
| 4. Releasing disc | 15. Hub nut lockwasher |
| 5. Releasing disc collar | 16. Clutch hub assembly |
| 6. Releasing disc bearing | 17. Clutch shell |
| 7. Spring, inner | 18. Retaining ring, clutch shell bearing |
| 8. Spring, outer | 19. Bearing, clutch shell |
| 9. Retaining ring, outer drive plate | 20. Rivet, starter clutch (12) |
| 10. Outer drive plate (8) | 21. Starter Clutch |

6. Consult "1970 and Earlier Clutch Disassembly" to complete disassembly.

INSPECTION

1. Inspect the clutch springs for heat damage and replace any spring under the following free-length limits: inner springs are to be $2\frac{5}{16}$ in., 1970-71 outer springs are to be $1\frac{3}{4}$ in., and 1972 and later outer springs are to be $2\frac{1}{2}$ in.

2. If the clutch shell bearing action is rough or has excessive play, it may be replaced by arbor-pressing it in and out

after the retaining ring is removed with snapping pliers.

3. Check the releasing disc bearing action for roughness or excessive play and replace if necessary.

4. Consult "1970 and Earlier Inspection" for additional procedures.

1971 AND LATER CLUTCH ASSEMBLY

1. Consult "1970 and Earlier Clutch Assembly."

Timing Gearcase

SPORTSTER

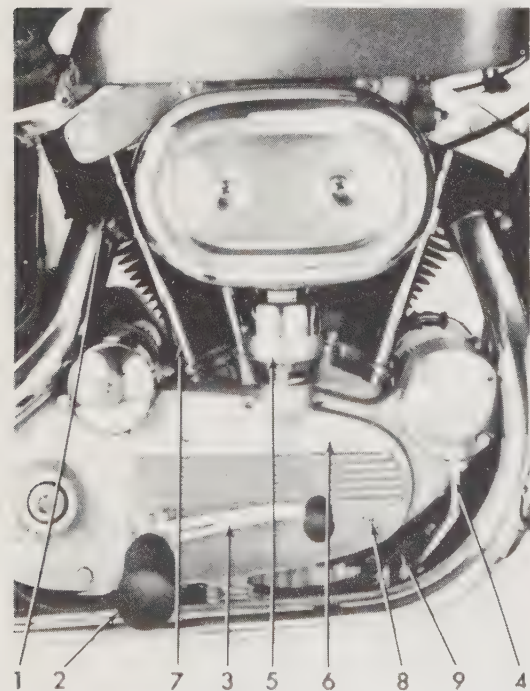
Disassembly

1. Remove the exhaust pipe assemblies, footrest, shift lever, breather pipe, contact breaker or magneto, as described in "Contact Breaker Assembly" or "Magneto Removal," and pushrods as described in "Pushrod Removal and Installation."

2. Drain the oil, remove the gearcase cover screws, and remove the cover from its dowel pins by tapping it with a soft mallet or hammer and wood block where the cover projects beyond the gearcase. Remove the cover gasket.

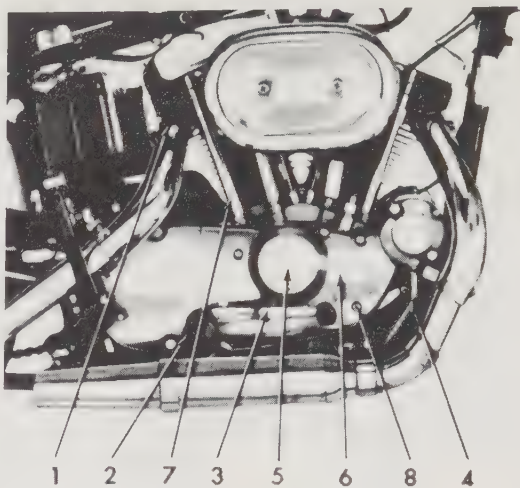
3. Remove the tappets and guides as described in "Tappet Disassembly."

4. Disconnect the clutch cable.



Removing gearcase cover on 1970 and earlier models

1. Exhaust pipe clamp (2)
2. Footrest
3. Gearshift foot lever
4. Breather pipe
5. Circuit breaker
6. Gearcase cover
7. Pushrod (4)
8. Gearcase cover screws (11)
9. Clutch cable



Removing gearcase cover on 1971 and later models

1. Exhaust pipe port clamp (2)
2. Footrest
3. Gearshift foot lever
4. Breather pipe
5. Circuit breaker
6. Gearcase cover
7. Pushrod (4)
8. Gearcase cover screw (11)

5. Remove the rear cylinder exhaust, rear cylinder intake, front cylinder exhaust, and front cylinder intake cam gears and cam gear plates. Gear lobes are numbered from 1-4 to designate their positions from the back to the front of the gearcase. Remove and separate the gear shaft shims for replacement in their original positions.

6. Remove the idler gear and its fiber washer.

7. Remove the pinion gear with Pinion Gear Puller (H-D Part No. 96830-51) or a suitable substitute.

8. Remove the oil pump drive gear.

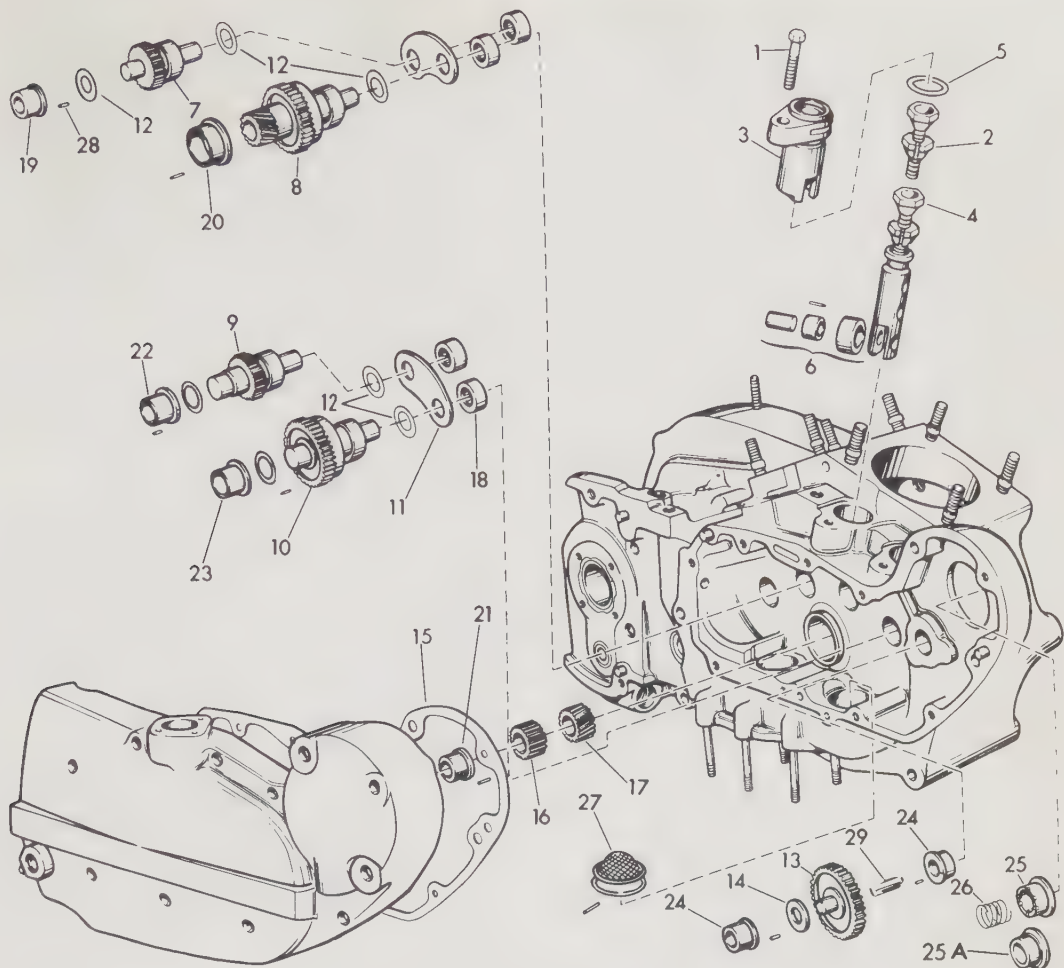
Inspection

1. Clean all of the parts except the cover gasket in a suitable solvent and blow dry with compressed air.

2. Clean the inside of the gearcase, taking care to keep the solvent from soaking through the crankcase.

3. Inspect all parts for wear or damage and replace as necessary. Bushings need not be removed unless wear or damage makes replacement necessary.

4. Inspect the crankcase oil screen for a clogged condition and clean or replace as necessary. Probe the screen hole with a hooked piece of wire to check for foreign objects.



Gearcase and tappet assembly

- | | |
|-------------------------------------|---|
| 1. Tappet guide screw | 15. Gearcase cover gasket |
| 2. Tappet screw with nut | 16. Flywheel shaft pinion gear |
| 3. Tappet guide | 17. Oil pump drive gear |
| 4. Tappet and roller | 18. Cam gear needle roller bearing (4) |
| 5. Tappet guide O-ring | 19. Rear exhaust cam gear shaft bushing |
| 6. Tappet roller kit | 20. Cam gear and timer shaft bushing |
| 7. Rear cylinder exhaust cam gear | 21. Pinion gear shaft bushing |
| 8. Rear cylinder intake cam gear | 22. Front intake cam gear shaft bushing |
| 9. Front cylinder intake cam gear | 23. Front exhaust cam gear shaft bushing |
| 10. Front cylinder exhaust cam gear | 24. Idler gear shaft bushing (2) |
| 11. Cam gear plate (2) | 25A. Oil separator bushing |
| 12. Camshaft washer—0.005–0.007 in. | 27. Crankcase oil strainer, retainer pin and gasket |
| 13. Idler gear | 28. Gearcase cover bushing pin (7) |
| 14. Idler gear shaft fiber washer | 29. Idler gear shaft |

5. Replace the idler gear bushing or shaft if worn.

6. Replace the gear assemblies when excessive lash is present, the teeth are damaged or the cams are worn or pitted.

7. Blow the crankcase relief pipe clear with compressed air.

8. Inspect breather oil separator seal ring for free action.

9. If shaft clearance in the cover bushings exceeds 0.0005–0.001 in. by 0.001 in. or more, bushing replacement is necessary. Replace the bushings also if the flanges are worn.

10. If the shaft clearance in the bearings exceed 0.0005–0.0025 in., bearing replacement is necessary.

11. Inspect the cam gear plates for

wear or damage and replace if necessary.

12. Replace the pinion gear if clearance is present, since any lash will cause noisy operation.

13. Oil separator bushings must have free-play and $\frac{1}{16}$ in. running clearance with the generator oil slinger washer.

14. Remove the cam gear needle bearing with Needle Bearing Puller (H-D Part No. 97270-60) or disassemble the crankcase as described in "Crankcase Disassembly" and arbor press them out. Press on the printed side of the bearing only when replacing, taking care to press the bearing in absolutely straight. Laying a flat piece of metal over the bearing will protect it. Press until flush with the mating surface.

15. Remove the gearcase cover bushings with Crankcase Cam Gear Shaft Bushing Remover (H-D Part No. 95760-36), (H-D Part No. 95760-69), or a suitable substitute.

16. Drift the crankcase bushings out from the flywheel side with a suitable drift, or use the above special tool if the crankcase is still assembled.

17. Press the front cylinder exhaust bushing into the gearcase cover with the oil hole toward the rear of the cover. Place a flat plate over the flange to protect it, and press until the flange sits flush on the mating surface. Drill, with a No. 31 drill, $\frac{1}{8}$ in. deep. Secure the pin slightly below the bushing and peen the bushing around the pin. Using the bushing boss hole as a guide, drill a $\frac{5}{32}$ in. oil hole through the bushing.

18. Press the front and rear cylinder intake bushings into the gearcase cover with the narrow section of the flange pointing downward. Repeat the above drilling operation.

19. Press the rear cylinder exhaust bushing flush with the oil feed pump seat from the outside. Repeat the above dowel pin installation, but do not peen the bushing.

20. Press the pinion gear shaft bushing into the cover with the oil hole pointing 30 degrees forward of its vertical centerline.

21. Arbor-press the crankcase side bushings in place, with the crankcase disassembled, from the gearcase side with the flange notch pointing upward. Repeat the above pin securing procedures.

22. To line-ream the cam gear and timer bushings, insert the Camshaft and Timer Shaft Bushing Reamer (H-D) Part No. 94803-37) "T" portion through the right crankcase from the flywheel side without turning the reamer and assemble the larger portion of the tool. Start the larger portion in the timer shaft bushing and assemble the gearcase cover. Always secure the cover with at least four screws when reaming and always turn the reamer to the right until bottom is reached, then withdraw it while still turning to the right. A suitable substitute reamer may be used if care is taken.

23. Line-ream the pinion shaft bushing with Pinion Shaft Bushing Reamer (H-D Part No. 94812-37) or a suitable substitute. The cover must be assembled and a guide bushing must be used.

24. Ream the rear cylinder exhaust cam gear bushings with Oiler Shaft Bushing Reamer (H-D Part No. 94811-36) or a suitable substitute. Work from the gearcase cover side.

25. Using only the smaller reamer of the Cam Shaft and Timer Bushing Reamer (H-D No. 94803-37) or a suitable substitute, line-ream the front cylinder exhaust and intake bushings, taking care not to remove more metal than necessary.

Breather Valve Timing

1. Rotate the engine until the flywheel timing mark is aligned in the crankcase inspection hole.

2. Install the scavenger pump.

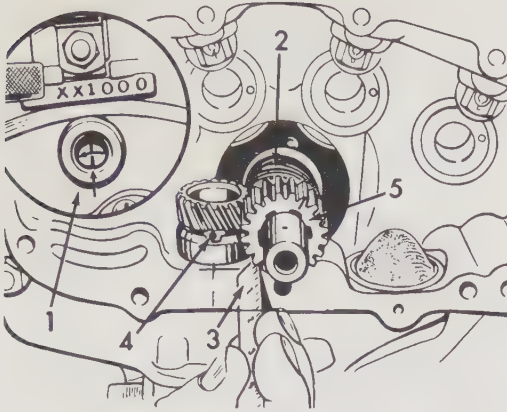
3. Slip the spiral gear on the splined pinion shaft until it is seated. At this point the breather sleeve gear timing hole will be aligned in the center of the breather housing slot.

4. Assemble the pinion gear with Gear Puller and Installer Tool (H-D Part No. 96830-51) or gently tap in place with a hammer and suitably sized drift. If the special tool is used, the locating collar will reach the gearcase face at a point which will leave $\frac{5}{16}$ in. between the gear and gearcase face.

The gap must be provided for if an alternate method of assembly is used.

Assembly

Assemble in reverse order of disassembly. Note the following:



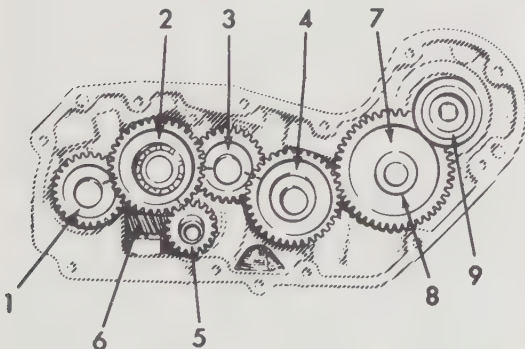
Breather valve timing

1. Flywheel timing mark
2. Oil pump drive gear (spiral gear)
3. Measurement
4. Timing hole in breather sleeve gear
5. Pinion gear

1. Cam gear marks must be aligned during assembly.

2. Place a 0.006 in. steel shim behind each cam gear and outside the two front cylinder cam gears. The same number of 0.005 or 0.007 in. washers found in disassembly should be used, then more can be added or removed until end play of 0.001–0.006 in. is arrived at.

3. Install the rear cylinder exhaust cam, front cylinder intake cam, rear cylinder intake cam, and front cylinder exhaust cam—in that order.



Timing gear alignment

1. Rear exhaust cam gear
2. Rear intake cam gear
3. Front intake cam gear
4. Front exhaust cam gear
5. Pinion gear
6. Crankcase breather sleeve gear
7. Intermediate gear (has no timing mark)
8. Intermediate gear fiber washer
9. Generator drive gear

4. Gears should rotate freely and move in and out of mesh freely, but not loosely. Check for excessive play by holding one gear steady and trying to rotate the others. There should be no play.

5. With the crankcase on its left-side, pour $\frac{1}{4}$ pt of engine oil over the gear train.

6. Install the idler gear shaft fiber washer on the cover side.

7. Install a new cover gasket.

8. Tap the cover in place over the dowels with a soft mallet.

9. Rotate the engine and check for binding. Too many shims will cause excessive drag. Cam gear end-play can be checked with a feeler gauge inserted through the tappet guides.

10. Assemble and secure the cover gasket with a non-hardening sealer.

11. Assemble the remaining items and adjust tappets as described in "Valve Tappet Adjustment."

12. If shaft clearance in the bearings exceeds 0.0005–0.0025 in., bearing replacement is necessary.

13. Inspect the cam gear plates for wear or damage and replace if necessary.

14. Replace the pinion gear if clearance is present, since any lash will cause noisy operation.

15. Oil separator bushings must have free-play and $\frac{1}{16}$ in. running clearance with the generator oil slinger washer.

16. Remove the cam gear needle bearings with Needle Bearing Puller (H-D Part No. 97270-60) or disassemble the crankcase as described in "Crankcase Disassembly" and arbor-press them out. Press on the printed side only when replacing, taking care to press the bearing in absolutely straight. Laying a flat plate over the bearing will protect it. Press until flush with mating surface.

17. Remove and install the cover and case bushings in the manner described in Sportster "Gearcase Inspection and Repair."

18. Line-ream all but the idler gear bushings in the manner described in Sportster "Gearcase Inspection and Repair." Always turn the reamer in to the right until it bottoms and then withdraw it while continuing to turn it to the right. Avoid removing an excessive amount of metal.

19. Ream the idler gear bushings with

Reamer (H-D Part No. 94806-57) or a suitable $\frac{9}{16}$ in. substitute.

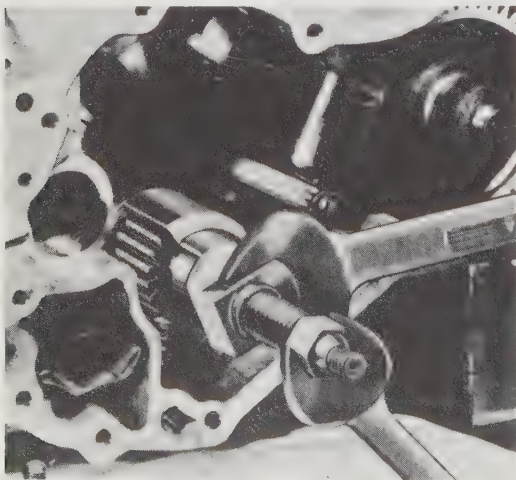
20. Line-ream the contact breaker shaft cover bushings with reamer (H-D Part No. 94803-37) or suitable substitute. Use the crankcase bearing opposite of the bushing to support the reamer as described in Sportster "Gearcase Inspection and Repair," Step 22.

21. Tilt the back end of the generator down as it is installed in the gearcase to lift the oil slinger over the intermediate gear. Then lift up slightly to mesh the generator drive gear with the intermediate gear.

GLIDE MODELS

Disassembly

- 1-3. Same as for Sportster.
4. Remove the generator.
5. Remove the oil screen cap, gasket, screen body, screen, and screen seal (if applicable).
6. Remove the idler gear and contact breaker gear spacers, and separate for reassembly.
7. Remove the cam gear, spacer shim, and thrust washer.
8. Remove the breather valve spacer shim, breather gear, contact breaker gear and idler gear.
9. Remove the left-hand threaded pinion gear shaft nut with Gear Nut Socket Wrench (H-D Part No. 94555-55) or vise grips.
10. Remove the pinion gear with Pinion Gear Puller and Installer (H-D Part



Removing pinion gear

No. 96830-51) or a gear puller, taking care to protect the gear teeth.

11. Remove the pinion gear key, spring, spacer, oil pump pinion shaft gear, and pump gear key.

12. Remove the breather screen and separator from the crankcase pocket.

13. Remove the oiler drive gear spring ring, oiler drive gear, and drive gear key.

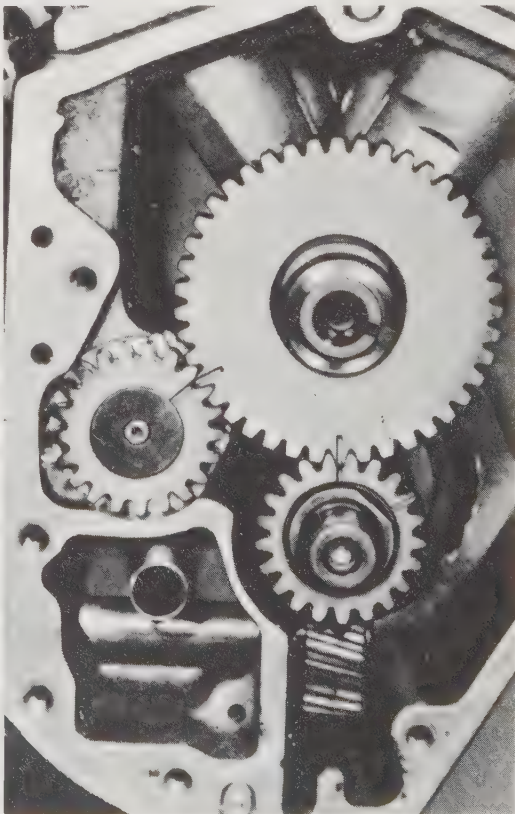
14. Remove the oil pump if necessary.

Inspection

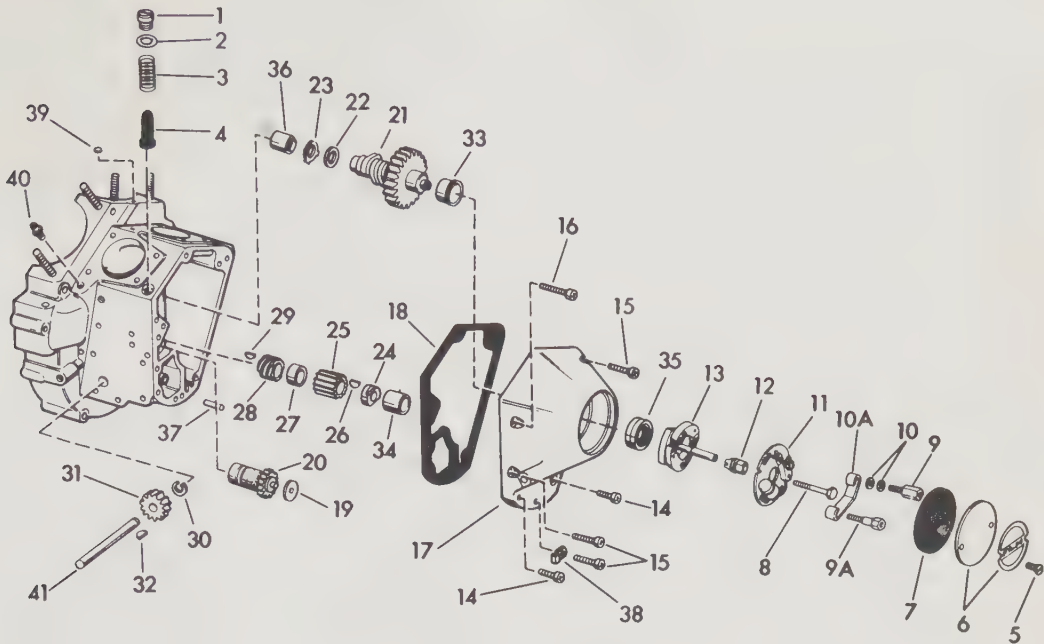
1-6. Same as for Sportster. Glide models have two screens to be serviced.

7. Assemble the pinion gear, cam gear, and gearcase cover, but do not include the cam gear end spacer. If the gears and bushings are still good, there should be no appreciable play and the cam gear's movement along the shaft should be free.

8. Inspect the needle roller cam shaft bearing for excessive wear, damage, or shaft play in excess of 0.003 in., and replace if necessary. Remove the needle bearing with Puller Tool (H-D Part No. 95760-69) or disassemble the crankcase



Timing gear alignment



Gearcase assembly

- | | |
|--|-------------------------------------|
| 1. Oil screen cap | 20. Breather gear |
| 2. Cap seal | 21. Cam gear |
| 3. Oil screen spring | 22. Cam gear spacing washer |
| 4. Oil screen | 23. Cam gear thrust washer |
| 5. Circuit breaker cover screws (2) | 24. Gear shaft nut |
| 6. Circuit breaker cover | 25. Pinion gear |
| 7. Circuit breaker cover gasket | 26. Pinion gear key |
| 8. Circuit breaker cam assembly bolt | 27. Pinion gear spacer |
| 9. Circuit breaker screw (2) (1970) | 28. Oil pump pinion shaft gear |
| 9A. Circuit breaker plate screw (1971 and later) | 29. Oil pump pinion shaft gear key |
| 10. Circuit breaker plate screw lockwasher and washer (1970) | 30. Oil pump drive gear locking |
| 10A. Retainer (1971 and later) | 31. Oil pump drive gear |
| 11. Circuit breaker plate assembly | 32. Oil pump drive gear key |
| 12. Circuit breaker cam | 33. Gear cover camshaft bushing |
| 13. Circuit breaker advance assembly | 34. Gear cover pinion shaft bushing |
| 14. Gear cover screw, 1 in. (2) | 35. Camshaft oil seal |
| 15. Gear cover screw, 1 1/4 in. (3) | 36. Camshaft needle bearing |
| 16. Gear cover screw, 1 3/4 in. (1) | 37. Cover dowel pin (2) |
| 17. Gear cover | 38. Wire clip |
| 18. Gear cover gasket | 39. Welch plug |
| 19. Breather gear washer | 40. Oil line fitting |
| | 41. Oil pump shaft |

as described in "Crankcase Disassembly," and arbor-press it out. Press on the printed side only when replacing with the Bearing Tool (H-D Part No. 97270-60) or arbor-press it into place. Laying a flat plate over the bearing will protect and guide the bearing straight in. Press until it is flush with the mating surface.

9. Inspect all bushings for excessive wear, pitting, proving, and shaft play in excess of 0.001 in. Replace if necessary.

10. Remove the pinion and camshaft cover bushings with Puller Tool (H-D

Part No. 95760-69) or a suitable substitute. Install and secure a new bushing in the same manner described in Sportster "Gearcase Inspection and Repair" step no. 12. The pinhole must be $\frac{3}{16}$ in. deep before pressing the bushing into place, then continue to drill until the hole is $\frac{9}{32}$ in. deep.

11. Line-ream the pinion and camshaft cover bushings as described in Sportster "Gearcase Inspection and Repair," using Pinion Shaft Bushing Reamer (H-D Part No. 94805-57) or a suitable $\frac{9}{16}$ in. substitute on the pinion bushing, and

Cam Gear Shaft Bushing Reamer (H-D Part No. 94802-36) or a suitable substitute on the cam bushing.

12. Remove and install the contact breaker and idler gear bushing with a suitable drift and an arbor press. Press until flush with mating surfaces.

Assembly

Assemble in reverse order of disassembly. Note the following:

1. Check for shaft end-play by assembling the breather gear, a new dry cover gasket, and a spacing shim. Lay a straight-edge across the gearcase at the shim and measure the gap between the two with a feeler gauge. Subtract 0.006 in. for gasket compression. Correct end-play with breather valve and rear spacing shims to within 0.001–0.005 in. Shims are available in 0.115, 0.120, and 0.125 in. thicknesses.

2. Install the thrust washer, spacing shim, cam gear, and gear cover. Measure play between the cover bushing and cam gear by inserting a feeler gauge through the tappet guide hole. Correct the end-play with spacer shims to within 0.001–0.005 in.

Shims are available in 0.005 in. gradations from 0.050–0.070 in.

3. Assemble the gears with the timing marks aligned.

4. Pour $\frac{1}{4}$ pt of engine oil over the gear train and check for free motion.

5. Secure the gasket with a non-hardening sealer and secure the cover.

Crankcase

SPORTSTER

Disassembly

1. Remove the engine from frame as described in "Engine Removal."

2. Remove the cylinders and pistons as described in "Cylinder and Piston Disassembly."

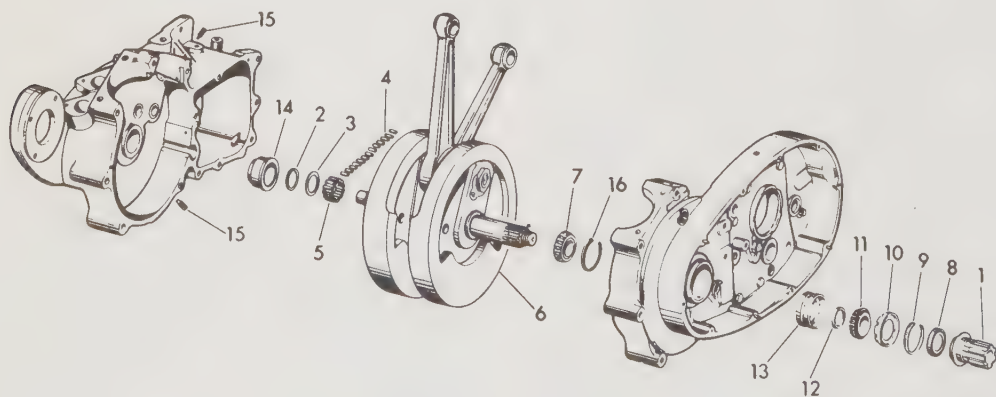
3. Remove the oil pumps as described in the "Lubrication Systems" section and drain the oil.

4. Remove the contact breaker as described in "Contact Breaker Assembly Removal."

5. Remove the generator and starter.

6. Remove the tappets as described in the "Valve Tappets and Guides" section.

7. Remove the sprocket shaft extension with a sprocket shaft extension puller (H-D Part no. 96015-56) or a suitable substitute. Solid sprocket models can be removed with a claw puller.



Crankcase assembly

- | | |
|---|--|
| 1. Sprocket shaft extension | 9. Sprocket shaft bearing spring ring (outer) |
| 2. Pinion shaft bearing snap ring | 10. Sprocket shaft bearing spacer |
| 3. Pinion shaft bearing washer | 11. Sprocket shaft Timken bearing left half |
| 4. Pinion shaft roller bearing (13) | 12. Sprocket shaft Timken bearing spacer |
| 5. Pinion shaft roller bearing retainer | 13. Sprocket shaft Timken bearing outer race |
| 6. Connecting rod and flywheel assembly | 14. Pinion shaft bushing |
| 7. Sprocket shaft Timken bearing right half | 15. Pinion shaft bearing bushing screw (2) |
| 8. Sprocket shaft oil seal | 16. Sprocket shaft bearing spring ring (inner) |

Figure following name of part indicates quantity necessary for one complete assembly.

8. Remove the speedometer drive unit, right crankcase bolts, stud lock nuts, rear mount bolts, battery carrier or oil tank bracket, rear engine mount, and top center crankcase stud.

9. Loosen the top of the crankcase by tapping it with a soft mallet and separate the cases.

10. Pry the pinion bearing shaft snapping from the shaft and remove the shaft bearing washer, roller bearings, and bearing retainers.

11. Remove the transmission as described in "Transmission Disassembly."

12. Arbor-press the sprocket shaft to remove the flywheel assembly from the left case. If drifted free, flywheel alignment will be lost.

13. Remove the Timken bearing right half with a sprocket shaft bearing puller (H-D Part No. 96015-52) or a suitable substitute if flywheel is to be disassembled or if the bearing is to be replaced.

14. Pry free the sprocket shaft oil seal and spring with a pointed instrument and replace both.

15. With the crankcase clutch side supported by parallel bars, place the right half of the bearing on the left and arbor-press out the bearing spacers, left half, and outer race.

16. With the pinion shaft secured in a copper or wood-jawed vise, remove the

lock plate screw, lock plate, and crankpin nut.

17. Loosen the left flywheel by striking its rim at a point 90 degrees from the crankpin with a soft mallet and remove the flywheel.

18. Separate the connecting rods from the crankpin bearing by holding the bearing with a suitably sized piece of pipe and lifting the rods free.

19. Remove and separate the bearing for reassembly.

20. Remove the lock plate screws, lock plates, and sprocket and crank pin lock nuts.

21. Tap the flywheels with a soft mallet to loosen the shafts and remove the shafts and keys.

Inspection

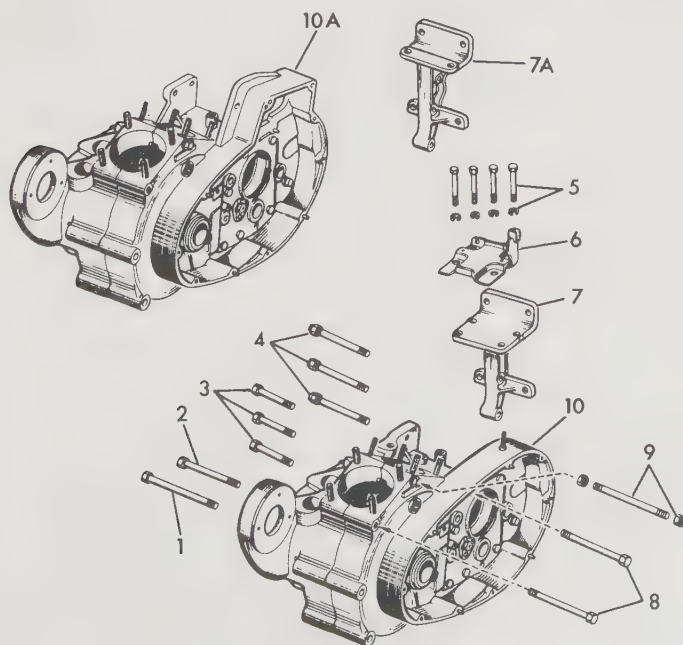
1. Clean all parts in a suitable solvent and blow dry. Blow all oil holes clear.

2. Inspect all parts for a worn, pitted, or damaged condition and replace if necessary.

3. Replace the rods, bearing, and crankpin as an assembly if parts are excessively worn.

4. Inspect the pinion shaft bushing and shaft for wear or damage and replace if necessary.

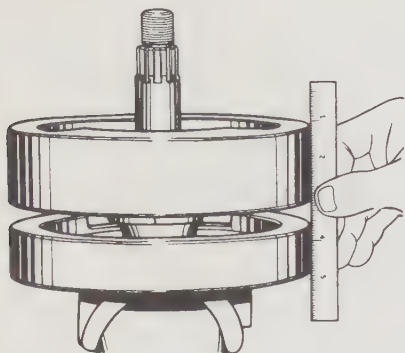
5. Inspect the sprocket shaft bearing



Crankcase assembly

1. Crankcase mounting bolt
 $\frac{5}{16} \times 4\frac{7}{16}$ "
2. Crankcase mounting bolt
 $\frac{5}{16} \times 4\frac{1}{16}$ "
3. Crankcase mounting bolt
 $\frac{5}{16} \times 2\frac{3}{8}$ " (3)
4. Crankcase rear mounting
stud and lock nut (3)
5. Engine rear mounting
bolt and lockwasher (4)
(1966 and earlier), (2)
(1967)
6. Battery carrier (1966 and
earlier)
7. Engine rear mount (1966
and earlier)
- 7A. Engine rear mount (1967)
8. Crankcase bolt (2)
9. Crankcase stud and lock
nut (center)
10. Crankcase (1966 and
earlier)
- 10A. Crankcase (1967)

Figure following name of part indicates quantity necessary for one complete assembly.



Checking flywheel alignment

assembly for wear or damage. Timken rollers must be replaced in sets.

6. Replace worn or damaged flywheel thrust washers in the following manner:

a. Drill a hole slightly deeper than the washer on its outer edge using a $\frac{1}{8}$ in. drill.

b. Pry the washer free with a pointed tool.

c. File the staked flywheel material smooth with emery paper and thoroughly clean the washer seat.

d. Insert a new washer taking care to seat it fully.

e. Secure the washer by center punching the flywheel around the washer.

7. Lap worn connecting rod races until there is no wear on the shoulder and both rods will accept the same size rollers. The lapping tool must fit in the bearing race snugly before compound is applied. Connecting rod lapping arbor (H-D Part No. 96740-36) or a suitable substitute, used at 150–200 rpm in a lathe, will provide the best results. Use a smooth motion.

8. Secure the pinion shaft to the right flywheel making sure all parts are completely clean.

9. Secure the pinion shaft key.

10. Secure the pinion shaft in a copper or wood-jawed vise and tightly secure the pinion shaft nut with a crankpin and flywheel nut wrench (H-D Part No. 94546-41) until the lockplate notches line up with the nut edges. Do not use additional leverage as damage will result.

11. Secure the crankpin and nut in the above manner.

12. Fit the rod bearings in the following manner:

a. Assemble the thoroughly cleaned sprocket and pinion shafts to the flywheel. If the lockwasher screw holes won't line up, increase the tightness of the shaft nut.

b. Secure the crank pin in the left flywheel.

c. Secure the flywheel and sprocket shaft with the crank pin in a vertical position in a copper or wood-jawed vise.

d. Install a connecting rod bearing set on the crankpin and check for a plug fit of both rods. If necessary, lap the tighter of the two rods until both are even.

e. Check for correct fit by subtracting one half the specified running clearance from the roller size.

f. The upper end rod furthest from the flywheel should have side shake of $\frac{1}{32}$ – $\frac{3}{64}$ in. Bearings must not extend beyond the rod edges.

13. Replace the pinion shaft bushing and bearing. Place the arbor guide sleeve (H-D Part No. 96728-56), or a suitable substitute, through the Timken bearing from the inside of the case, and fit the bearings to a running clearance of 0.0008–0.001 in. A slightly looser fit is recommended for sustained high speed driving.

Assembly

1. Secure the thoroughly cleaned left fly wheel and sprocket shaft in a copper or wood-jawed vise and assemble the crank pin and right flywheel.

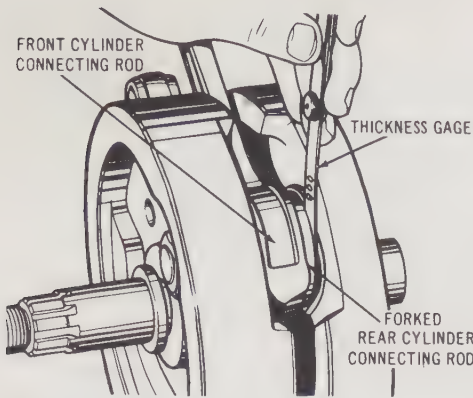
2. Check flywheel alignment with a straight edge. Alternately tighten the crank pin nut slightly and recheck alignment until secure. A soft mallet can be used to aid alignment. This method generally provides alignment to within 0.002 in.

3. Press one rod against the flywheel thrust washer and measure play between the opposite rod and washer with a feeler gauge. Check for the following if play is less than 0.006 in.:

a. Flywheels and crank pin tapers were oily during assembly allowing crankpin nuts to be overtightened.

b. Flywheel thrust washers are improperly seated.

c. Flywheel tapered holes are worn to excessive clearance.



Measuring rod side clearance

d. Cracks at the flywheel tapered holes.

4. If play is greater than 0.010 in., wait until the flywheels are trued before correcting.

5. True the flywheels with a truing device (H-D Part No. 96650-30) in the following manner:

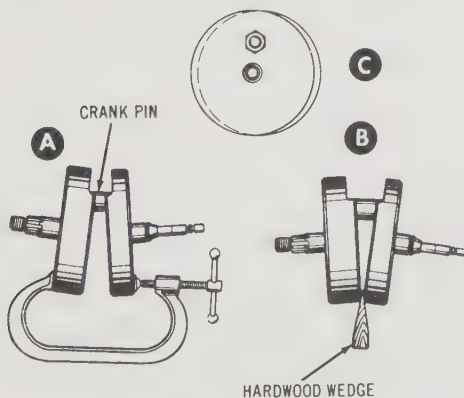
a. Place the flywheel assembly in the device and adjust until the centers are snug.

b. Rotate the flywheels and mark the high point with chalk. Loosen the device slightly and align using the three following methods.

NOTE: (A) or (B) should be done before (C).

(A). A C-clamp can be used on the rims directly opposite the crankpin along with moderate blows to the rim at the crank pin with a soft mallet.

(B). A hardwood wedge can be driven between the wheels directly opposite the crankpin. Moderate blows with a soft mallet are the safest way to perform this operation.



Aligning the flywheels

(C). Strike the wheel, at about 90 degrees from the crank pin, with a firm blow with a soft mallet.

c. Repeat Steps (A) and (B) above. If truing procedures were effective, shaft play should be 0.001 in. or less. The factory device has 0.002 in. gradations. Check for a cracked flywheel, enlarged tapered hole or worn sprocket or pinion shafts if repeated truing attempts fail.

d. Secure the crank pin nuts tightly when the flywheels are true, then re-check on device. Minor adjustments may be made without loosening the crankpin nuts.

6. An alternate method is to use a dial indicator, and a lathe or some other means of rotating the flywheels on a steady plane.

7. Replace the sprocket shaft bearing inner spring ring.

8. Support the left crankcase, crankcase side up, on an arbor press and press the Timken bearing outer race in until it seats on the spring ring. Sprocket shaft bearing tool (H-D Part No. 97081-54) or an arbor press may be used for all of these operations.

9. Secure the flywheel assembly in a copper or wood-jawed vise with the sprocket shaft up.

10. Install a flywheel support plate (H-D Part No. 96137-52) or a suitable substitute between the flywheel halves.

11. Press the bearing right half on the shaft with a 1 in. I.D. (inside diameter) x 6 in. steel tube until the bearing seats on the shaft shoulder.

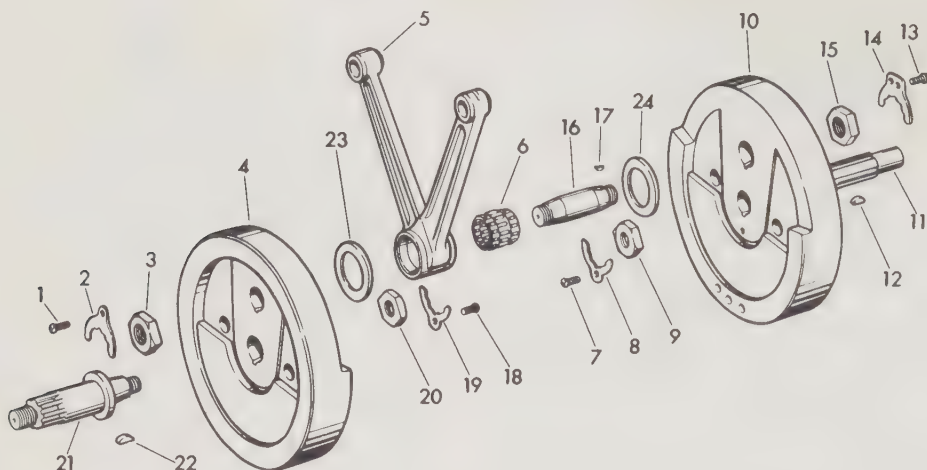
12. Slip the sprocket shaft bearing spacer in place and lubricate the bearing with engine oil.

13. Insert the sprocket shaft through the bearing outer race in the left and press the left half of the bearing in place until it is seated, taking care not to damage it. Both bearing halves must be tight against their spacers.

14. Place the notched side of the sprocket shaft bearing spacer on the shaft and gently press it into place or use a suitable screw type extractor until the spacer is tight against the outer bearing race.

15. Install the outer spring ring and oil seal with the lipped side in.

16. Press the sprocket shaft extension



Crankshaft assembly

- | | | |
|--------------------------------------|--------------------------------|-------------------------------------|
| 1. Crank pin lock plate screw | 9. Pinion shaft nut | 17. Crank pin key |
| 2. Crank pin nut lock plate | 10. Flywheel (right) | 18. Sprocket shaft lock plate screw |
| 3. Crank pin nut | 11. Pinion shaft | 19. Sprocket shaft nut lock plate |
| 4. Flywheel (left) | 12. Pinion shaft key | 20. Sprocket shaft nut |
| 5. Connecting rods | 13. Crank pin lock plate screw | 21. Sprocket shaft |
| 6. Crank pin roller and retainer set | 14. Crank pin nut lock plate | 22. Sprocket shaft key |
| 7. Pinion shaft lock plate screw | 15. Crank pin nut | 23. Crank pin boss washer (left) |
| 8. Pinion shaft nut lock plate | 16. Crank pin | 24. Crank pin boss washer (right) |

in place until seated with the shaft and extension splines aligned.

17. Assemble the pinion shaft bearing, bearing washer, and a new bearing snap-ring, taking care to seat the snapping in the shaft groove.

18. Measure the flywheel end-play with a flywheel end-play gauge (H-D Part No. 96700-38) on the sprocket shaft.

19. Adjust the gauge pin until it gently touches the case. Push the shaft to the left and measure the clearance with a feeler gauge.

20. A dial indicator can also be used by securing the indicator so that the plunger gently contacts the shaft, then shift the shaft and measure as above.

21. Adjust flywheel end-play within the crankcase to 0.009-0.013 in. by using the appropriate steel thrust collar. Collars are available in 0.004 in. gradations from 0.066-0.102 in.

22. Assemble the remaining parts in the reverse order of disassembly.

23. Assemble the transmission as described in "Transmission Assembly."

24. Coat the crankcase joint faces with a non-hardening sealer.

25. Apply engine oil to the pinion shaft bearing; assemble and secure the crankcase halves.

26. Install the battery carrier, rear engine mount, speedometer drive unit, transmission mainshaft sprocket, starter, and clutch assembly.

27. Replenish the transmission oil.

28. Install the oil pump, timing gears, gear case cover, tappets, generator, pistons, cylinders, contact breaker or magneto, cylinder heads, and install the engine in the frame.

GLIDE MODELS

Disassembly

1-6. Same as for the Sportster.

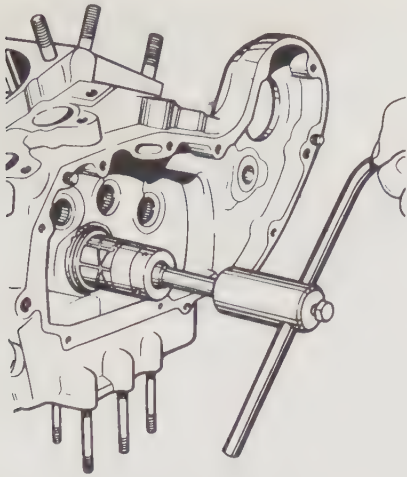
7. Remove the gearcase assembly as described in "Gearcase Disassembly."

8. Remove the $\frac{3}{8}$ x $3\frac{1}{4}$ in. crankcase bolts, $\frac{5}{16}$ x 5 in. studs, breather stud and chain oiler, $\frac{5}{16}$ x 6 in. stud, and $\frac{11}{32}$ x $5\frac{13}{16}$ in. studs.

9. With the gear case side up, tap the crankcase with a soft mallet and remove the crankcase right half, spiral lock ring, and bearing washers and bearing retainer assembly.

10. Remove the sprocket shaft spacer (1968 and earlier models) and secure the pinion shaft in a copper or wood-jawed vise with the left case up.

11. Remove the left-hand threaded



Lapping the pinion shaft bearing race

sprocket shaft bearing nut with the sprocket shaft bearing nut wrench (H-D Part No. 97235-55A) or a suitable substitute.

12. With the left case supported on parallel bars, arbor-press the sprocket shaft until the flywheel assembly comes free and remove the sprocket bearing half, washer, and spacer.

13. Pry the flywheel side outer snap-ring free (1968 and earlier models).

14. Arbor-press the bearing outer race

press plug (H-D Part No. 97194-57) or a suitable drift to prevent damage to the races (1968 and earlier models).

15. Using a suitably sized brass drift and hammer, tap the bearing race free from the opposite side. Remove the outer race snap-ring with a $\frac{1}{8}$ in. punch or any suitable pointed instrument if the bearing set is to be replaced. This is easily done by tapping the ring through the oil hole (1969 and later models).

16. Consult Sportster "Crankcase Disassembly" for sprocket bearing inner half removal instructions. Use a bearing pulser (H-D Part No. 96015-56). Leave the assembly in the vise.

17. Insert a 5 x $\frac{1}{2}$ in. rod through the flywheel holes to secure them. Disassemble as directed in Sportster "Disassembly."

Inspection

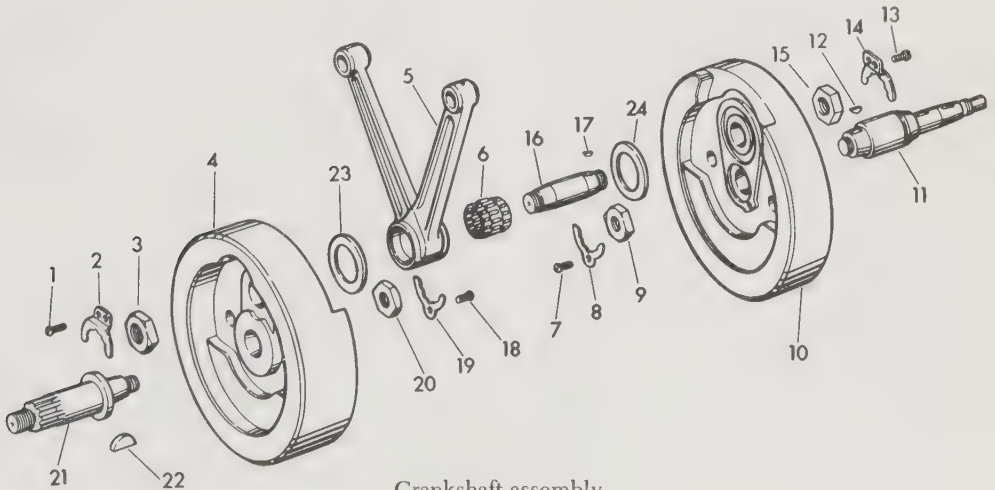
Consult Sportster "Inspection."

Assembly

Assemble in the reverse order of disassembly. Note the following:

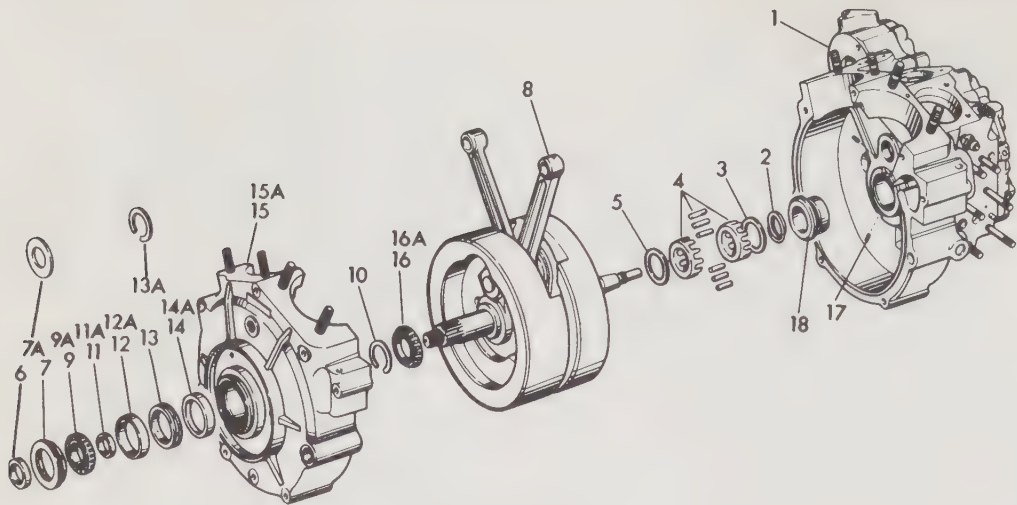
1. Install the outer race snap-ring in the left case.

2. With the case supported on paral-



Crankshaft assembly

- | | | |
|---|-------------------------------------|-------------------------------------|
| 1. Lock plate screw (4) | 9. Gear shaft nut (2) | 17. Crank pin key |
| 2. Lock plate (2) | 10. Right flywheel | 18. Lock plate screw (see item 1) |
| 3. Crank pin nut (2) | 11. Pinion shaft | 19. Lock plate (see item 8) |
| 4. Left flywheel | 12. Pinion shaft key | 20. Sprocket shaft nut (see item 9) |
| 5. Connecting rods (one forked, one single end) | 13. Lock plate screw (see item 1) | 21. Sprocket shaft |
| 6. Bearing rollers and retainers | 14. Lock plate (see item 2) | 22. Sprocket shaft key |
| 7. Lock plate screw (see item 1) | 15. Crank pin lock nut (see item 3) | 23. Flywheel washer (2) |
| 8. Lock plate (2) | 16. Crank pin | 24. Flywheel washer (see item 23) |



Crankcase assembly

- | | | |
|---|---|-----------------------------------|
| 1. Right crankcase half | 9. Sprocket bearing half | 14. Bearing outer race |
| 2. Spiral lock ring | 9A. Sprocket bearing half (1969) | 14A. Bearing outer race (1969) |
| 3. Bearing washer (2) | 10. Outer race snap ring (1968 & earlier) | 15. Left crankcase half |
| 4. Bearings and retainer | 11. Bearing inner spacer | 15A. Left crankcase half (1969) |
| 5. Bearing washer (see item 3) | 11A. Bearing inner spacer (1969) | 16. Sprocket bearing half |
| 6. Sprocket shaft spacer | 12. Bearing outer race | 16A. Sprocket bearing half (1969) |
| 7. Sprocket shaft bearing nut | 12A. Bearing outer race (1969) | 17. Pinion shaft bearing race |
| 7A. Sprocket shaft bearing seal washer (1969) | 13. Bearing outer spacer | lock screw (2) |
| 8. Flywheel and rod assembly | 13A. Outer race snap ring (1969) | 18. Pinion shaft bearing race |

Note: Keep parts 9, 11, 12, 13, 14 and 16 as a set. Do not transpose or interchange parts.
Figure following name or part indicates quantity necessary for one complete assembly.

lel bars, press the bearing outer races and snap-ring into the crankcase bushing. Use an outer race press plug (H-D Part No. 97194-57) or a suitable drift to press them in, one at a time, until sealed with the wider end out.

3. Install the bearing and spacer on the sprocket shaft, with the shaft in case and the outer bearing halves as described in Sportster "Crankcase Assembly."

4. The bearing must not be preloaded (under excessive tension). If shaking the case half does not reveal a slight amount of play in the case bearing half, or if the flywheel assembly will not rotate freely, the bearing must be removed and a 0.003 in. shim (H-D Part No. 23741-55) added to spacers. Assemble and recheck for play.

5. Slip the inner bearing washer, bearings, and outer washer in place on the pinion shaft and secure a new spiral lock ring in the shaft groove.

6. Apply a non-hardening sealer to the joint surface and secure the cases with the $\frac{5}{16}$ x 6 in. and the $\frac{11}{32}$ x $5\frac{13}{16}$ in. studs.

7. Consult Sportster "Crankcase Assembly" for flywheel end-play checking and correcting procedures.

8. Secure the case halves.

9. Secure the sprocket shaft bearing nut (1968 and earlier models).

10. Install the sprocket shaft spacer or seal washer, sprocket or sprocket shaft extension, and sprocket nut.

11. If the sprocket and the rear wheel sprocket are out of alignment, consult the "Chassis" chapter.

12. Complete reassembly by reversing "Engine Removal" procedures.

Transmission

SPORTSTER

Crankcase and Transmission Disassembly

This section only applies if such work as overhauling the crankcase or flywheel is to be done. Otherwise the trans-

mission can be serviced through the access cover.

1. Disassemble the crankcase as described in "Crankcase Disassembly."

2. Remove the first gear washer and first gear from the countershaft.

3. Free the assembled mainshaft.

4. Remove Second gear.

5. Remove the gear shifter cam cap screw and retainer ring, and then the shifter mechanism will come free of the access cover.

6. Remove the First gear washer, Third gear, and the shifter fork from the countershaft and remove the assembled countershaft.

7. For further information, consult "Shifter Mechanism Disassembly" and "Mainshaft and Countershaft Disassembly."

TRANSMISSION ACCESS COVER REMOVAL

1. With a drip pan under the clutch, remove the footrest, stoplight switch, brake pedal, chaincase cover, clutch, primary chain, and compensating sprocket assembly by consulting the "Clutch Disassembly" section.

2. Loosen the front cylinder exhaust pipe and muffler; remove the starter

crank assembly, right footrest, and shifter lever. Remove the sprocket cover, starter crank gear, starter clutch gear, and starter crankshaft as described in the "Starter" section.

3. Loosen the mainshaft nut.

4. Remove the drive-chain master link and remove the chain.

5. Remove the mainshaft nut, lock-washer, sprocket, oil seal retainer screws and lockwashers, oil seal, seal retainer, and gasket from the mainshaft. If the sprocket requires assistance from a claw puller, make certain that at least two teeth are grasped by the puller or else damage will result.

6. Remove the access cover cap bolts.

7. Pry the clutch gear oil seal free and replace it.

8. Remove the hub nut rubber O-ring from the groove in the clutch gear (if applicable).

9. Pull the access cover free with Transmission Access Cover Puller (H-D Part No. 95560-57) or an appropriate sized gear puller

SHIFTER MECHANISM DISASSEMBLY

1. Remove Second gear from the mainshaft, cap screw, retainer ring, and washer. Using snap-ring pliers, remove the cam retaining ring and slide it off the camshaft thrust washer.

2. Remove the gear shifter cam, pawl carrier, pawl carrier support, and pawl carrier support shims (if applicable). Remove the pawl spring and shifter pawls.

NOTE: On 1972 and later models, remove the retaining rings to free the pawls, spacers, and springs from the pawl carrier. To free the shifter forks and finger rollers, first remove the countershaft assembly.

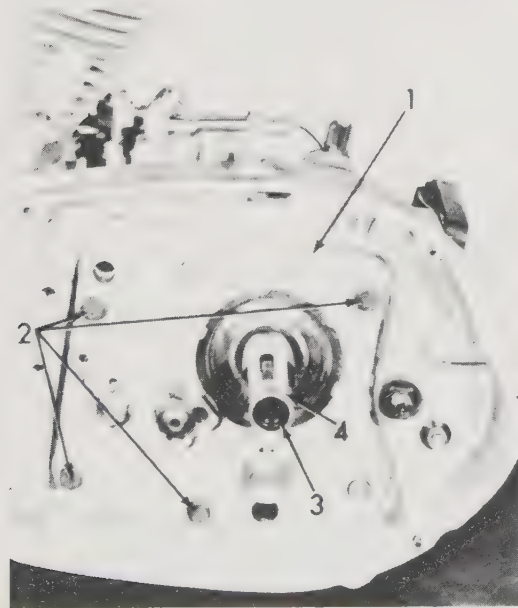
3. After removing the lever arm shaft, fork shaft, cam follower retainer ring, follower retainer, and follower spring, the shifter forks and finger rollers should come free.

MAINSHAFT AND COUNTERSHAFT DISASSEMBLY

1. Remove from the right crankcase the mainshaft, thrust washer, and the 23 rollers.

2. Remove First gear from the mainshaft using a claw puller if necessary.

3. Pry the Third gear retainer ring



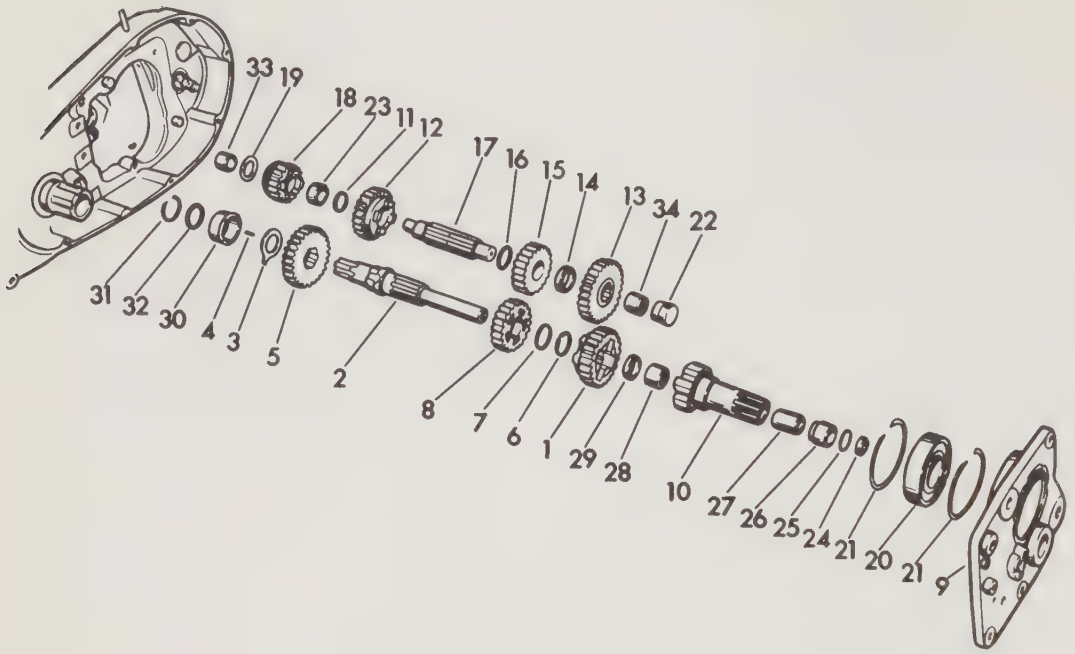
Access cover

1. Access cover

2. Access cover cap screws (4)

3. Clutch gear oil seal

4. Hub nut rubber O-ring (XLCH, 1966 and earlier XLH)



Mainshaft and countershaft assembly

- | | | |
|---|---|--|
| 1. Mainshaft second gear | 14. Countershaft gear spacer | 25. Clutch hub nut O-ring (1970 only) |
| 2. Transmission mainshaft | 15. Countershaft second gear | 26. Clutch gear oil seal extension (1970 only) |
| 3. Mainshaft thrust washer (variable thickness) | 16. Countershaft second gear thrust washer | 27. Clutch gear bushing |
| 4. Transmission mainshaft roller (23) | 17. Transmission countershaft | 28. Clutch gear needle roller bearing |
| 5. Mainshaft low gear | 18. Countershaft low gear | 29. Mainshaft thrust washer |
| 6. Mainshaft third gear retainer ring | 19. Countershaft low gear washer (variable thickness) | 30. Mainshaft roller bearing race |
| 7. Mainshaft third gear washer | 20. Mainshaft ball bearing | 31. Mainshaft roller bearing retainer ring |
| 8. Mainshaft third gear | 21. Mainshaft ball bearing snap ring (2) | 32. Mainshaft roller bearing washer |
| 9. Access cover | 22. Countershaft oiler plug | 33. Countershaft bearing—closed end |
| 10. Clutch gear | 23. Countershaft low gear bushing | 34. Countershaft bearing—open end |
| 11. Countershaft low gear washer | 24. Clutch gear oil seal (1970 only) | |
| 12. Countershaft third gear | | |
| 13. Countershaft drive gear | | |

from its groove in the mainshaft and replace it.

4. Remove the Third gear washer and Third gear from the mainshaft.

5. With the access cover on an arbor press, press the clutch gear free from its bearing.

6. Remove the First gear washer and Third gear from the countershaft.

7. With a claw puller, remove the drive gear from the countershaft, and remove the gear spacer, Second gear, and the thrust washer.

8. Remove the countershaft low gear and washer.

9. Drift the oiler plug free from inside the access cover.

TRANSMISSION SPROCKET AND SHIFTER MECHANISM INSPECTION AND REPAIR

1. Clean all metal parts in a suitable solvent and blow dry.

2. Inspect the mainshaft sprocket for worn or damaged teeth and splines; replace if necessary. Replace the oil seal and gasket if necessary.

3. Replace the gear shifter cam retaining ring. Inspect the shifter cam for worn or grooved thrust points which cause irregular shifting and replace if necessary.

4. Inspect the shifter pawl carrier for grooves or wear at the fingers. Inspect the pawl carrier support for breaks or cracks.

5. Check the bearing for excessive play by loosely assembling the shifter cam, pawl carrier, support, and shims (if applicable). Replace any worn or pitted parts.

6. Replace the pawl carrier springs with fourteen or sixteen cadmium plated or coil springs, or fourteen to sixteen black phosphatized springs. Spring free-length should be $2\frac{25}{32}$ in. when new.

7. Check pawl spring operation by inserting the springs in the carrier holes. Spring free-length should be $1\frac{7}{32}$ in. when new. Replace any worn, grooved, or cracked parts.

8. Inspect the finger rollers and shifter forks for warping, wear, or grooves.

9. Check the shifter cam follower and spring for freedom of movement and replace if worn. Free-length of a new spring should be $1\frac{19}{32}$ in. for models up to 1969, $1\frac{7}{32}$ in. for 1970–71 models, and $1\frac{3}{4}$ in. between the hooks for 1972 and later models.

10. Remove the shifter fork shaft only if it is to be replaced. The shaft is press-fit and aligned at the factory, and therefore should be replaced together with a new cover. Check the shaft for warping or damage by observing shifter fork movement on the shaft. The shaft may only be replaced by pressing out the old and pressing in the new, taking care to keep it perpendicular to the cover face.

11. Inspect the gear shifter lever arm for warping or damage.

12. Check the bushings for excessive play by inserting and rotating the shaft. Bushings must be pressed in with the gearcase cover and oil seal removed. Drift from the right-side. Remove any high spots with a $\frac{1}{2}$ in. reamer and replace the oil seal.

MAINSHAFT AND COUNTERSHAFT INSPECTION AND REPAIR

1. Clean all metal parts in a suitable solvent and blow them dry.

2. Inspect, and replace if necessary, all gears, pinions, and dogs for a worn, chipped, or otherwise damaged condition—especially if the transmission frequently jumped out of gear.

3. Inspect the mainshaft and countershaft for excessive wear on the splines

and bearing surfaces, and replace if necessary.

4. Slip the gears into position on their shafts and check for excessive play and replace if necessary. Specifications are listed in the “Transmission Specifications” chart.

5. The low gear bushing is a press-fit. If replaced, check for high spots and ream it until round.

6. Remove the clutch gear oil seal extension with cloth or leather-covered vise grips in order to remove the clutch gear bushing and needle roller bearing.

7. Drift out the clutch gear bushing and drift out the needle roller bearing and thrust washer from the opposite end of the gear.

8. Press a new bushing into the clutch gear shaft, insert the mainshaft and rotate the gear to check for high spots and free-movement. If there is not 0.001–0.002 in. play, ream the bushing to size (H-D Reamer, Part No. 94829-42).

9. Press on the printed side of the needle roller bearing to install the bearing and thrust washer.

10. Seal the oil extension with aluminum paint.

11. Install a new oil seal and O-ring.

12. Test the main shaft and countershaft for alignment with a dial indicator and replace if warped 0.003 in. or more.

13. Check the play between the mainshaft ball bearing, clutch gear, and access cover. Replace if play exceeds specifications listed in “Transmission Specifications.”

14. Remove the mainshaft ball bearing snap-ring and press the bearing free on an arbor press from the outside in. If the bearing is drifted out, it should be replaced.

15. Inspect the mainshaft rollers and bearing race and replace if pitted, scored, or worn beyond specifications. Pack with grease before assembly.

16. Remove the race by removing the retaining ring and washer. Heat the case around the bearing and drift from the outside in. Press in a new race until its shoulder seats. Check clearances against those listed in “Transmission Specifications” and replace if necessary. Replace the snap-ring.

17. Check the countershaft needle roller bearings against the proper specifications listed in "Transmission Specifications." Drift free only if replacement is necessary, pressing on the printed side. The access cover must be $\frac{5}{64}$ in. from the side.

18. Replace the oiler plug after the shaft clearances are established and replace with the oil hole up.

Transmission Assembly

1. Install the cam follower retainer ring and retainer in the access cover.

2. Seat the pawl carrier springs against the pawl carrier support.

3. Assemble the shifter pawls and springs in their respective sockets with the top engaging grooves facing one another.

4. Depress the pawls with a knife blade and assemble the cam, carrier, support, and shims (if applicable).

5. Install the camshaft thrust washer and a new retaining ring, using snap-ring pliers.

6. Depress one pawl at a time with a knife blade and rotate the shifter cam to ensure free cam movement.

7. Use shims to adjust the height of the cam as shown to ensure proper shifter fork operation.

NOTE: On 1972 and later models, assemble the pawls on the carrier using spacers (one on outside, one underneath) to align the spring hooks and holes. Secure the pawl retaining ring and spring. Depress one pawl at a time while inserting the shifter cam in the pawl carrier. Assemble the carrier into the support so that the carrier ear seats between the springs.

8. Arbor-press the clutch gear into the mainshaft bearing.

9. Assemble the Second gear thrust washer, Second gear, Second gear spacer, and the drive gear on the countershaft, making sure that Second gear rotates freely. Install the assembly in the access cover.

10. Install the mainshaft second gear, countershaft third gear, and shifter forks on the fork shaft with the finger studs pointed toward the access cover and the fork finger in the running groove of the gear. Install the finger rollers.

11. Install the cam follower and follower spring in the follower retainer. Check to make sure that the follower is free in the retainer.

12. Secure the shifting assembly to the access cover with the capscrew and retainer ring while engaging the shifter fork finger rollers in the shifter cam slots.

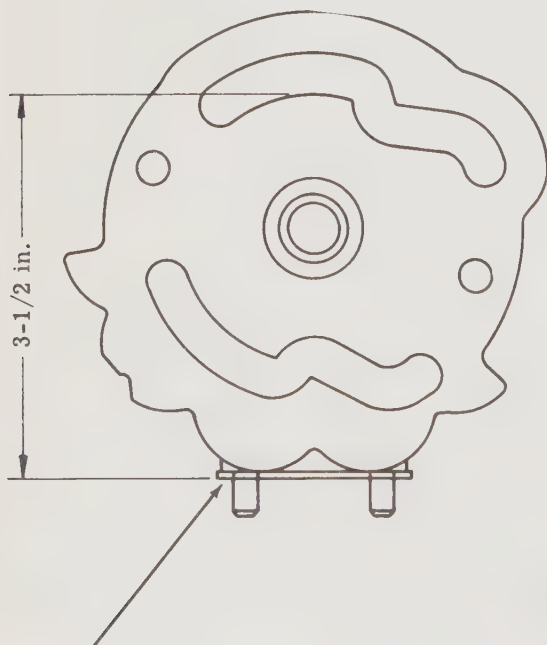
13. Assemble First gear, Third gear, the Third gear washer, and a new retainer ring on the mainshaft. The ring is easily inserted with Retainer Ring Sleeve (H-D Part No. 96396-52), but snap-ring pliers will also work.

14. Slide Second gear and the clutch gear onto the mainshaft.

15. Place the thinnest, First gear, variable washer against the countershaft shoulder.

16. Slide First gear on the shaft and check the clearance between the faces of it and Third gear. Try different First gear washers until a clearance of 0.038–0.058 in. is obtained. (Washers are available in thicknesses of 0.065, 0.075, 0.085, and 0.100 in.).

17. Assemble all parts to the access cover except for the mainshaft thrust washer, countershaft first gear washer, mainshaft rollers, roller bearing washer,



Shimming dimensions for pawl carrier support: rotate cam to 3rd gear position and shim as required using a quantity of 0.010 in. thick shims as necessary to obtain a $3\frac{1}{2}$ in. dimension to the cam surface as shown.

and bearing retainer ring. Shift through the gears several times to ensure proper operation. With the transmission in Neutral, check to see if gear face clearances are between 0.038–0.058 in. Replace the shifter forks if clearance is not obtained.

MAINSHAFT AND COUNTERSHAFT END-PLAY

1. Install the thinnest First gear and Third gear variable washers. Temporarily secure the Third gear washer with a dab of heavy grease, with the ear pointing down.

2. With all parts assembled, install the access cover on the crankcase. Take care to align the dowel pins, tap the cover into place with a soft mallet, and secure it with the cover cap screws.

3. Check mainshaft end-play with a dial indicator from the sprocket side of the shaft by shifting the shaft back and forth. Repeat on the countershaft from the access cover side.

4. Wedge a discarded wheel spoke, or something similar, in the countershaft end hole and measure end-play while pulling and pushing on the spoke.

5. End-play for both shafts must be within 0.003–0.009 in. Adjust by installing larger mainshaft thrust and countershaft First gear washers. Washers are available in 0.005 in. gradations from 0.050–0.075 in., and countershaft washers of 0.020, 0.030, and 0.040 in. are also available.

6. Center the lever arm shaft so it will engage the pawl carrier support when the cover is in place. Lightly rotate the shaft to ensure correct engagement before securing the cover.

7. Grease the mainshaft bearing race and assemble the rollers. Secure the roller with the bearing washer and retaining ring.

MAINSHAFT SPROCKET, STARTER, AND CLUTCH ASSEMBLY INSTALLATION

1. Temporarily install the foot-shift lever and place the transmission in Fourth gear.

2. Install the oil seal gasket, seal, retainer, lockwashers, and screws, but do not secure them yet.

3. Temporarily place the sprocket on

the mainshaft to correctly position the retainer.

4. Remove the sprocket and secure the screws.

5. Assemble the sprocket, lockwasher, and nut. Secure the washer ear against the nut.

6. Install the rod end and drive chain.

7. Consult the "Starter" section for starter installation procedures.

8. Consult the "Clutch" section for clutch installation procedures.

9. Lubricate the transmission as described in the following section.

TRANSMISSION LUBRICATION

1. Stand the motorcycle upright and remove the oil filler plug from the chaincase top and the oil level plug from the chaincase bottom.

2. Fill the transmission with engine oil until the overflow begins from the oil level plug hole.

3. Secure both plugs when overflow ceases.

GLIDE MODELS

Linkage Adjustment

HAND SHIFT

Adjust the hand shift if the transmission is moved.

1. Place the transmission in Third gear on four-speed models, and Second gear on three-speed models.

2. Disconnect the shifter rod at the shifter lever.

3. Gently shift the lever back and forth until you feel the spring plunger reach its seat.

4. Adjust the clevis until the rod can be attached without moving the lever.

FOOT SHIFT

Adjust the shifter rod when the transmission is moved if wear necessitates adjustment.

1. Align the shift lever clamping slot with the foot lever shaft notch.

2. Disconnect the lever from the rod and adjust the rod end as desired. Secure the locknut and connect the rod and lever.

Transmission Removal

1. Disconnect the battery ground wire from the negative terminal.

2. Remove the footrest, chain cover compensating sprocket (if applicable, consult "Clutch" section), or shaft nut (nut is removed by striking a 1½ in. wrench with a hammer).

3. Remove the chain adjuster mounting bolt and the starter shaft thrust washer (1965 model only).

4. Remove the clutch, clutch hub, drive sprocket, and primary chain as described in the "Clutch" section.

5. Loosen the five transmission mounting bolts and remove the chain-guard and oiler.

6. Remove the starter solenoid terminal wires.

7. Remove the battery, carrier, and regulator ground strap from the right-side of the transmission. Remove the right rear footrest bracket.

8. Remove the starter motor bracket and pull the starter motor out of the left-side of the frame. Remove the kick-starter lever (if applicable).

9. Loosen the locknut at the clutch foot control or booster, and turn the rod out until it can be slid free of the clutch release lever.

10. Remove the shifter rod.

11. Disconnect the speedometer cable and housing from the transmission.

12. Remove the Neutral indicator switch.

13. Remove the transmission as a unit.

Main Drive Gear Oil Seal

Consult the transmission as described in "Transmission Removal."

Shifter Cover Removal

1. Remove the transmission as described in "Transmission Removal."

2. Remove the twelve securing screws and pull the cover free from the two dowel pins.

Hand Shifter Cover

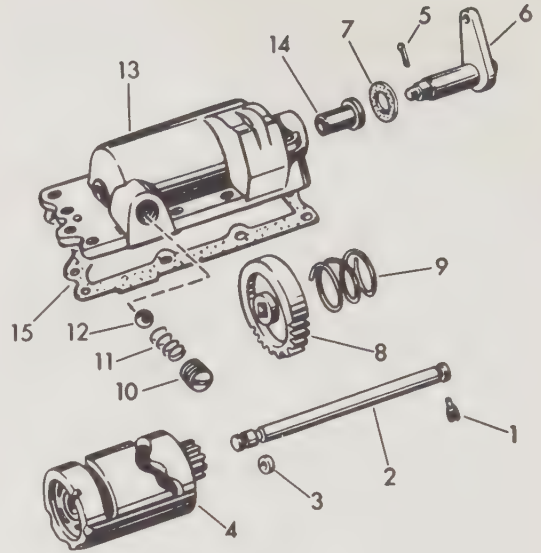
DISASSEMBLY

1. Remove the shaft lockscrew and drift the shaft free with a discarded valve stem or something similar.

2. Remove the shifter cam.

3. Remove the shifter lever cotter pin.

4. Pry the shifter gear from the shaft by tapping a screwdriver between the gear and the inside of the cover.



Hand shifter cover assembly

- | | |
|---------------------|---------------------------|
| 1. Shaft lock screw | 9. Shifter gear spring |
| 2. Shaft | 10. Cam plunger cap screw |
| 3. Oil seal | 11. Ball spring |
| 4. Shifter cam | 12. Plunger ball |
| 5. Cotter pin | 13. Cover |
| 6. Shifter lever | 14. Shifter lever bushing |
| 7. Leather washer | 15. Cover gasket |
| 8. Shifter gear | |

5. Remove the shifter lever and leather washer.

6. Remove the cam plunger capscrew, ball spring, and plunger ball.

INSPECTION

1. Clean all metal parts in a suitable solvent and blow them dry.

2. Inspect the shifter lever bushing for excessive wear—indicated by excessive lever play—and replace if necessary. Screw a ⅝ in. tap into the bushing. Remove the tap and heat the case to about 300 degrees. Screw in the tap, clamp it in a vise, and tap the cover with a soft mallet until the cover comes free.

3. Inspect the teeth on the shifter gear and cam pinion for wear or damage and replace if necessary.

4. Inspect the plunger ball seat and cam track for excessive wear and replace if the edges are not sharp.

5. The oil seal and cover gasket should be replaced but may be used again if in good condition.

ASSEMBLY

1. Hold the shifter gear spring in place inside the cover and place the shifter

gear on it so the gear hub is inside the spring. The gear must have the timing mark on the gear tooth facing the shift lever cover port.

2. Slip the leather washer onto the shifter lever and insert the lever through the case and spring so that it meshes with the shifter gear. The lever should be pointed toward the left.

3. Secure the assembly with the lever shaft cotter pin.

4. Insert the cam in the cover so that the pinion gear timing mark aligns with the shift gear mark.

5. Place the oil seal on the camshaft and insert it through the case and cam. Secure it with the shaft lock screw.

6. If cam end-play is greater than 0.0005–0.0065 in., install shims as necessary. If play is too little the cover can be filed as necessary.

Foot Shifter Cover

DISASSEMBLY

1. Remove the shifter lever screws, lever, dust shield, and long cover screws.

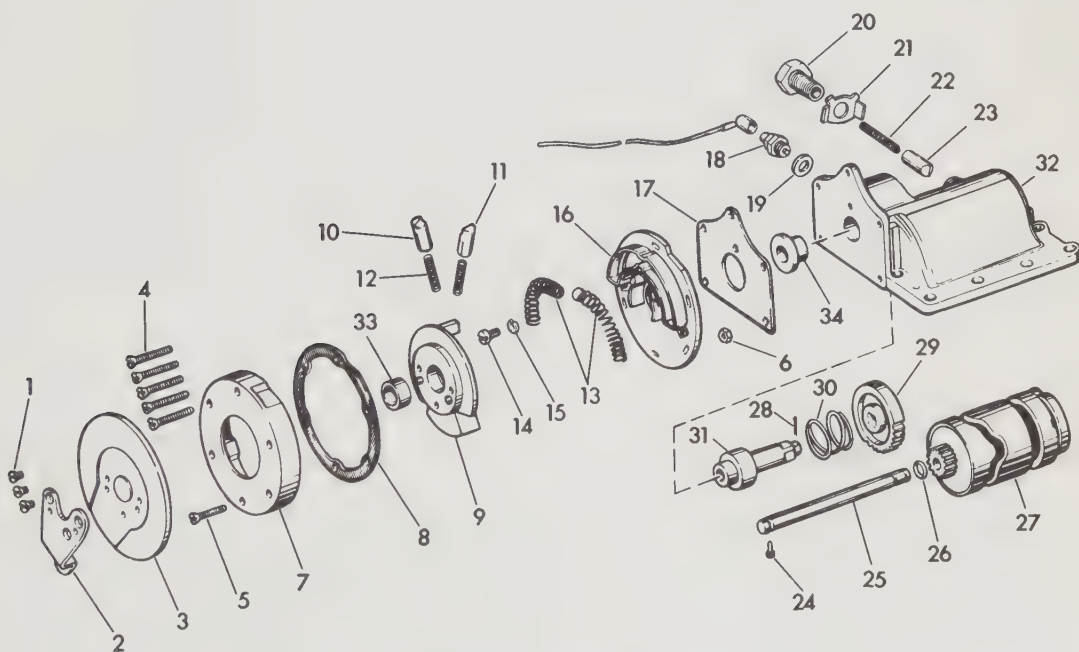
2. Remove the short cover screw nut from the back of the adaptor plate, withdraw the short cover screw, and remove the pawl carrier cover, gasket, pawl carrier, pawls, pawl springs, and pawl carrier springs.

3. Remove the adaptor plate bracket screw, washer, adaptor plate, and plate gasket.

4. Disconnect the neutral indicator switch from the cover.

5. Bend back the cam follower retainer washer ear to remove the retainer, washer spring, and cam follower.

6. Remove the camshaft lock screw and drift the camshaft from the cover, using



Foot shifter cover assembly

- | | | |
|--------------------------------|--|---------------------------|
| 1. Shifter lever screw (3) | 13. Pawl carrier spring (2) | 24. Cam shaft lock screw |
| 2. Shifter lever | 14. Adapter plate bracket screw | 25. Cam shaft |
| 3. Dust shield | 15. Adapter plate bracket screw washer | 26. Oil seal |
| 4. Shifter cover screw (5) | 16. Adapter plate | 27. Shifter cam |
| 5. Shifter cover screw (short) | 17. Adapter plate gasket | 28. Cotter pin |
| 6. Cover screw nut | 18. Neutral indicator switch | 29. Shifter gear |
| 7. Pawl carrier cover | 19. Washer | 30. Shifter gear spring |
| 8. Cover gasket | 20. Cam follower retainer | 31. Shifter shaft |
| 9. Pawl carrier | 21. Cam follower retainer washer | 32. Shifter cover |
| 10. Pawl (right) | 22. Spring | 33. Pawl carrier bushing |
| 11. Pawl (left) | 23. Cam follower | 34. Shifter shaft bushing |
| 12. Pawl spring (2) | | |

an old valve stem, or something similar, as a drift.

7. Remove the shifter shaft cotter pin, gear, spring, and shaft from the cover.

INSPECTION

1. Consult "Hand Shift Shifter Cover Inspection and Replacement."

2. The Neutral switch should be cleaned only with Gunk® or similar solvent.

3. Depress the neutral indicator switch plunger and observe whether or not it returns freely. If the plunger binds, the panel lamp will not light and the switch must be replaced. Do not run current through it without the panel lamp neutral indicator in series so the circuit is completed.

4. If the pawl carrier hole has been worn until it is oversized, replace the press-fit pawl carrier bushing.

ASSEMBLY

1. Hold the shifter gear spring in the cover and place the shifter gear on it so the gear hub is inside the spring. The gear tooth timing mark must face the cover.

2. Slide the shifter shaft through the cover until it meshes with the gear. The timing mark should be in line with the squared side of the shaft and slightly to the left of the last ratchet tooth on the shaft.

3. Gently tap the shaft and gear together; secure them with the shaft cotter pin.

4. Place the oil seal on the wider of the two camshaft end grooves.

5. Place the shifter cam in the cover and hold it in position where the cam pinion timing mark aligns with the shifter gear timing mark.

6. Secure the cam with the camshaft and secure the camshaft with the lock-screw.

7. Slip in the cam follower and spring and secure them with the retaining washer and retainer.

8. Secure the neutral indicator switch and check to make sure that the plunger contacts the shifter gear.

9. Secure the cover in a vise with the shifter mechanism end pointing up.

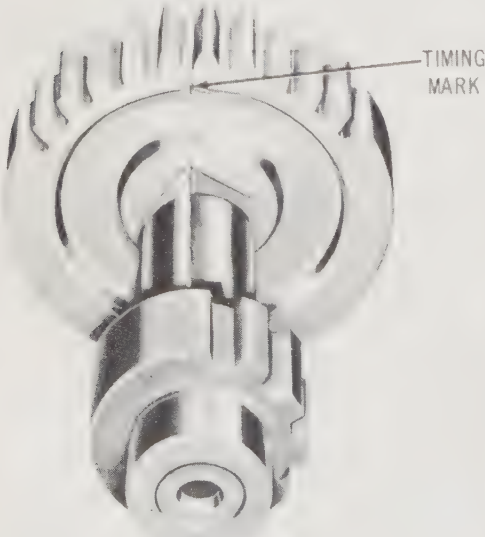
10. Place the adaptor plate gasket on the case.

11. Attach the cover screw nut to the back of the adaptor plate with a dab of heavy grease and place the adaptor plate on the gasket.

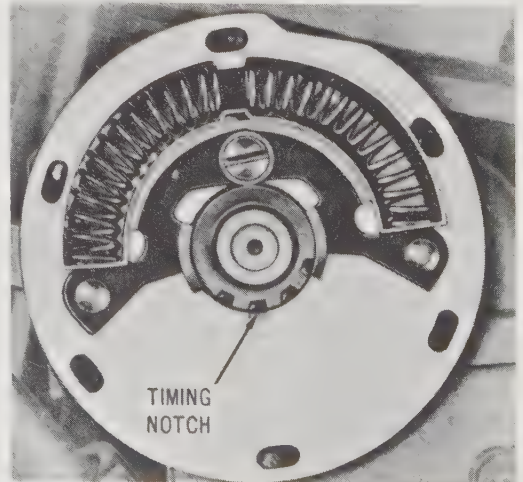
12. Loosely screw the adaptor plate bracket screw and washer into the hole above the end of the shifter gear.

13. Place the gearshift cam in any gear, other than Neutral, and rock the cam back and forth to be sure that the cam follower is seating properly in one of the indexing notches.

14. Rotate the adaptor plate until the plate timing notch lines up between the two bottom teeth of the shifter gear. Secure it with the adaptor plate bracket screw.



Aligning shifter gear timing marks



Aligning shifter adapter plate timing notches

15. Lightly grease the pawl carrier springs and place them in the slots on the adaptor plate.

16. Lightly oil the pawls and check to see that they move freely in the pawl carrier holes.

17. Install the pawl springs and pawls so that the end face notches face each other.

18. Place the pawl carriers on the shifter shaft so that the carrier lug seats between the pawl carrier springs.

19. Lubricate the pawl carrier back.

20. Assemble the cover gasket and cover. Apply Locktite® (H-D Part No. 99619-60) or a suitable thread-sealing compound to the cover screws and insert them. The short screw should seat in the cover screw nut. Secure all screws.

21. Place the dust shield over the pawl carrier dowel pins and set the shifter lever over the dust shield dowl pins. Secure it with the shift lever screws.

INSTALLATION

1. Apply sealer to the shifter cover and secure it to the gearbox.

2. Place the assembled shifter cover over the gearbox and secure it with the twelve securing screws. The two longer screws go in holes near the bulge over the shifter gear. The vented screw goes nearest the locating dowel pin on the

gearcase right side. Apply a thread sealer to all but the vented screw.

Shifter Fork

REMOVAL

1. Remove the shifter cover as described in "Shifter Cover Removal."

2. Disassembly is not necessary if the shifter fork assemblies are not damaged or worn and shifter clutches are not to be replaced.

3. Remove the shaft lockscrew and drift out the shaft.

4. Separate the shifter fork assemblies upon removal; do not mix parts during replacement.

DISASSEMBLY

1. Remove the finger rollers.

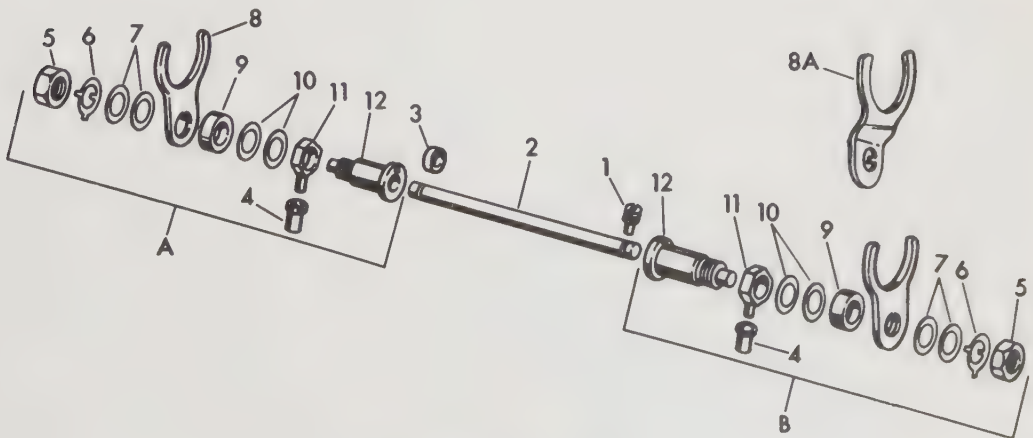
2. Free the bushing nuts by bending back the washer ears and remove both nuts and washers.

3. Remove the remaining parts, taking note of their positions as an aid in assembly.

INSPECTION

1. Clean all metal parts in a suitable solvent and blow them dry.

2. Replace bent or worn forks. Do not use forks which have been bent and then straightened.



Shifter fork assembly

- | | | |
|-------------------------------|--|---|
| 1. Lock screw | 7. Spacing shim (variable number)
(0.007 in.) (0.014 in.) | 9. Standard spacing shim (2) |
| 2. Shifter fork shaft | 8. Shifter fork (1 or 2) | 10. Spacing shim (variable number)
(0.007 in.) (0.014 in.) |
| 3. Rubber oil seal | 8A. Shifter fork (3-speed, reverse
only) | 11. Shifting finger (2) |
| 4. Shifter finger rollers (2) | | 12. Shifting fork bushing (2) |
| 5. Nut (2) | | |
| 6. Lock washer (2) | | |

3. Check the shifter fork bushings for excessive play and replace if necessary. Check new bushings on the shaft and determine if the shaft bushing contact surface is worn.

4. If the bushings bind, they can be lapped by coating the shaft with valve-grinding compound and then spinning the valve in the bushing until movement is free. Clean both parts again thoroughly.

ASSEMBLY

1. Assemble in reverse order of disassembly, taking care not to mix any parts. If parts are mixed, it would be better to replace both assemblies than guess which went where.

2. Place Fork Shifter Gauge (H-D Part No. 96384-39) on the shifter cover. Align the tool gauge blocks with the straight cam slots by laying the $\frac{3}{8}$ in. gauge rod through both. Secure the blocks with thumb screws.

3. Place the tool on the transmission case so that the shifter finger rollers engage the tool slots.

4. Check that the shifting clutches are centered by inserting a thickness gauge on both sides of the clutch.

5. Increase or decrease the number of variable shims, (0.014 or 0.017 in. shims

are available), between the fork and finger to center the clutches.

6. First and Second gears should have 0.075 in. clearance on both sides.

7. Third and Fourth gears should have 0.100 in. clearance on both sides.

8. Reverse gear should have 0.055 in. clearance between gear teeth.

9. If the gears have engaging dogs, rotate the gears so that the dogs on the gear and clutch overlap by about $\frac{1}{8}$ in. before checking clearance.

10. Secure the shaft nut with a thread-sealing compound. Avoid overtightening.

11. Install the forks in the gearbox and secure them with the shaft. The narrowest fork is for the high gear shifter clutch. Secure the shaft lock screw. Install the shifter cover as described in "Shifter Cover Replacement."

Four-Speed Gearbox Disassembly

1. Remove the transmission as described in the "Transmission Removal" section.

2. Remove the clutch as described in the "Clutch Disassembly" section.

3. Remove the starter assembly and clutch as described in the "Starter Disassembly" section.

4. Remove the shifter cover and shifting forks as described in "Shifter Cover Removal" and "Shifter Fork Removal" sections.

COUNTERSHAFT DISASSEMBLY

1. Bend the lockwasher ear away from the countershaft nut and remove both.

2. Drift the countershaft out of the case from left to right.

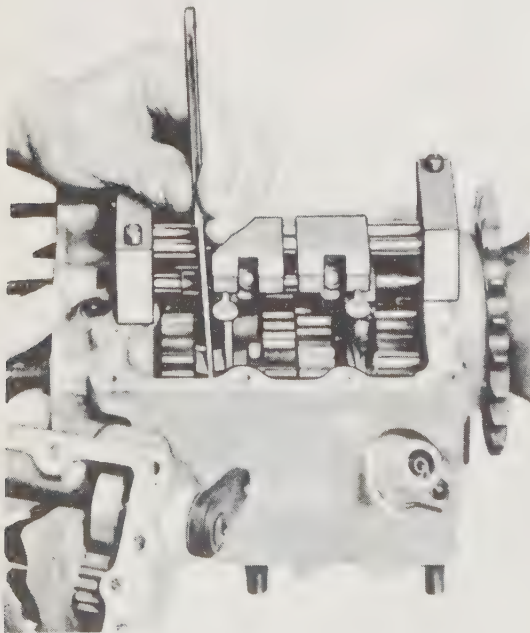
3. Remove First gear, the First gear bushing, First gear bearing washer, and shifter clutch off the splined countershaft gear.

4. With snap-ring pliers, remove the spring lockring, gear retaining washer, countershaft, Second gear, and Second gear bushing.

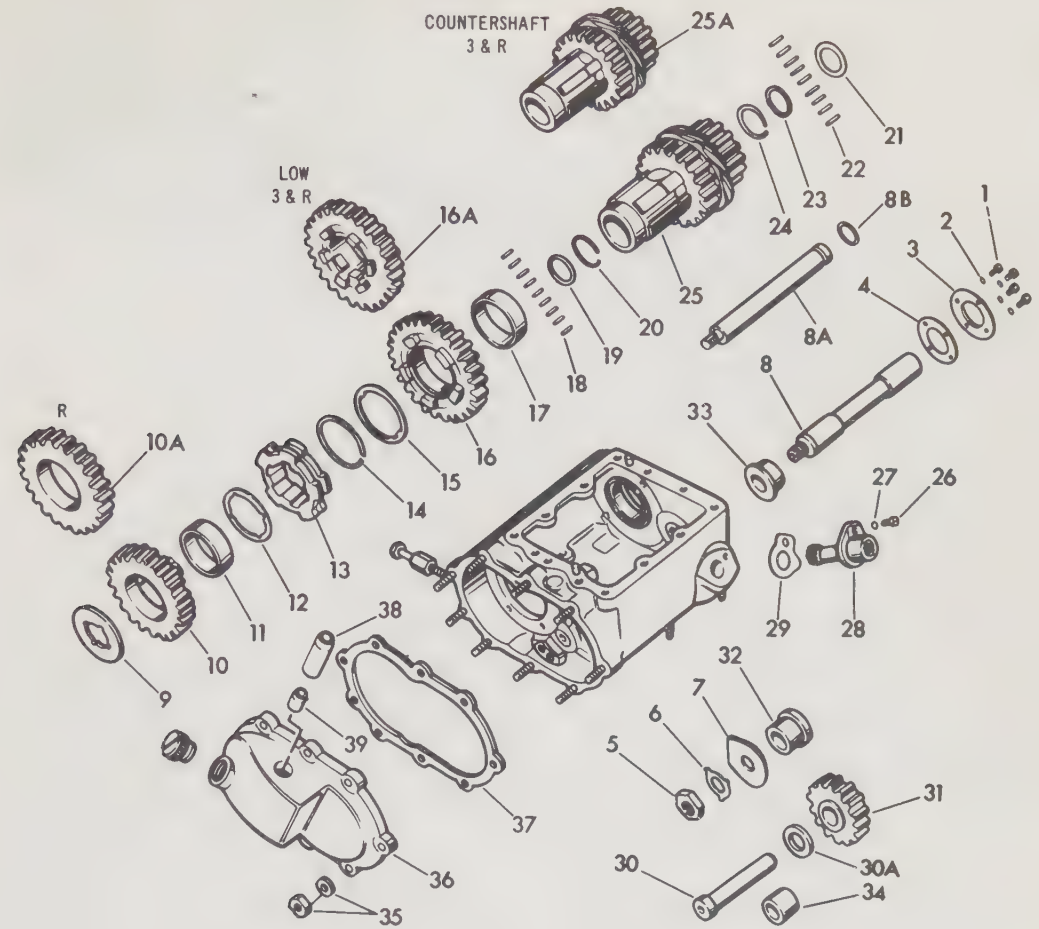
5. Remove the roller bearing rollers and roller retainer washer. Do not mix the roller sets; replace entire sets rather than individual rollers.

6. Pry the lockring free and remove the roller thrust washer, rollers, retainer washer, and lockring from the gear end of the countershaft gear.

7. Remove the speedometer drive



Checking shifter clutch clearances



Four-speed transmission assembly

- | | | |
|---------------------------------|---|---|
| 1. End cap screw (4) | 16. Countershaft second gear | 27. Washer |
| 2. End cap screw washer (4) | 16A. Countershaft low gear (3-speed and reverse) | 28. Speedometer drive unit |
| 3. End cap | 17. Second gear bushing | 29. Drive unit gasket |
| 4. End cap gasket | 18. Bearing rollers (22) | 30. Idler gear shaft |
| 5. Countershaft nut | 19. Roller retainer washer | 30A. Spacer washer |
| 6. Lock washer | 20. Lock ring | 31. Idler gear |
| 7. Lock plate | 21. Roller thrust washer | 32. Countershaft mounting collar (starter side) |
| 8A. Countershaft | 22. Roller bearing (22) | 33. Countershaft mounting collar (clutch side) |
| 8B. O-ring | 23. Retaining washer | 34. Idler gear bushing |
| 9. Countershaft gear end washer | 24. Lock ring | 35. Side cover nut and washer (9) |
| 10. Low gear | 25. Countershaft gear | 36. Side cover |
| 10A. Countershaft reverse gear | 25A. Countershaft gear (19-tooth for 3-speed and reverse) | 37. Side cover gasket |
| 11. Low gear bushing | 26. Speedometer drive housing screw | 38. Side cover upper bushing |
| 12. Low gear bearing washer | | 39. Side cover lower bushing |
| 13. Shifter clutch | | |
| 14. Spring lock ring | | |
| 15. Gear retaining washer | | |

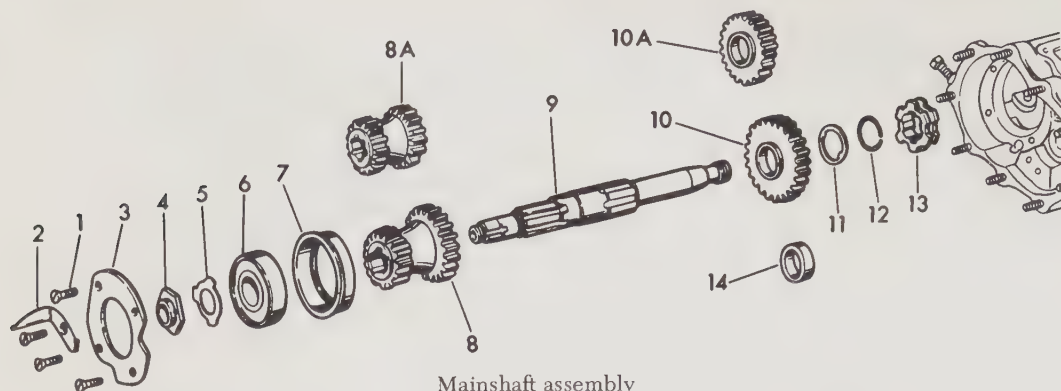
housing screw, washer, speedometer drive unit, and drive unit gasket.

8. Remove the idler gear shaft, spacer washer, and idler gear on three-speed and reverse-type transmissions. Inserting a $\frac{1}{4}$ -20 tap screw into the shaft will provide a grip for pulling the shaft free.

Apply 300° of heat to the case if the shaft will not move.

MAINSHAFT DISASSEMBLY

1. Remove the bearing housing retaining screws, oil deflector, and retaining plate.



Mainshaft assembly

1. Bearing housing retaining plate screw (4)
2. Oil deflector
3. Retaining plate
4. Ball bearing nut
5. Ball bearing washer
6. Mainshaft bearing

7. Mainshaft bearing housing
8. Low and second gear
- 8A. Low and reverse gear (hand-shift)
9. Mainshaft
10. Third gear

- 10A. Mainshaft second gear (hand-shift)
11. Retaining washer
12. Lock ring
13. Shifter clutch
14. Third gear bushing

2. Using a soft mallet, drive the mainshaft toward the right side of the case, until the mainshaft bearing or bearing housing is free from the case.

3. Pry the mainshaft second gear locking free of its groove and slide it onto the mainshaft splines.

4. Pull the assembled mainshaft as far as it will go to its right.

5. If the bearing housing does not come off with the bearing, slide the gear through it as far as it will go, clear the gear of the case, and drive the mainshaft out. This should free the housing.

6. Remove Third gear, the retaining washer, lockring, and shifter clutch off the mainshaft and lift them out of the case.

7. Remove the mainshaft through the right-side of the case.

8. If repair is necessary, disassemble the mainshaft gear and bearing assembly.

9. Secure the mainshaft in a copper or wood-jawed vise. Bend the lockwasher ear away from the shaft nut and remove both. Pull the bearing and then the gear from the shaft with a claw puller (H-D Part No. 95635-46) or press them off. Protect the shaft end if a puller is to be used (with H-D Part No. 95636-46).

Main Drive Gear

DISASSEMBLY

1. Secure the gearbox in a vise or to a work bench. Secure the chain sprocket

by laying a length of chain over its teeth and nailing the chain ends to the bench.

2. Bend back the washer ear and remove the locknut (which has a left-hand thread) and washer.

3. Remove the oil deflector and chain sprocket.

4. Push the main drive gear into the case and lift it and the thrust washer out.

5. Remove the 44 rollers and place them where no mix-ups or lost bearings will occur. Bearings must be replaced as an entire set.

6. Remove the drive gear oil seal, shaft seal, or main drive gear spacer only if worn or damaged. Consult the "Main Drive Gear Oil Seal Replacement" section for procedures.

INSPECTION

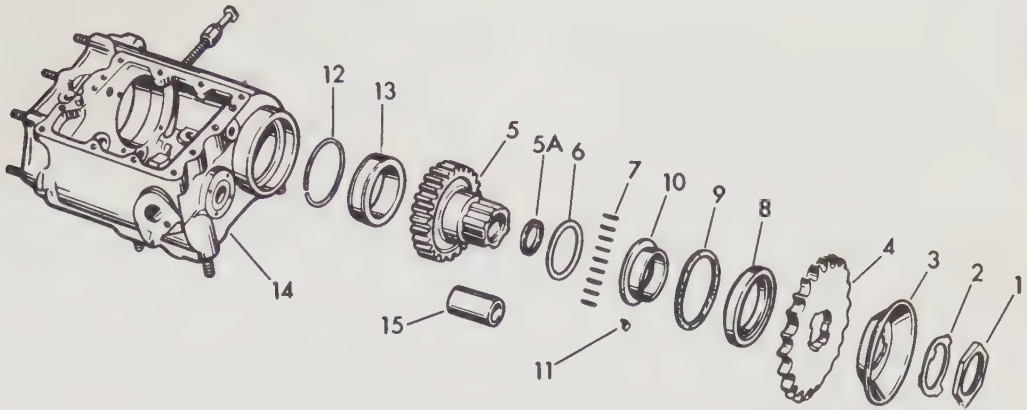
1. Clean all metal parts in a suitable solvent and blow them dry.

2. Inspect all of the gears for damage to the teeth or case hardening and replace if necessary.

3. Inspect all bushings, bearings, and shafts for wear and excessive play; replace if necessary.

4. The main drive gear bearing race can be pressed in and out. Heating the case to about 300 degrees will facilitate removal. Press a new bearing in until the flange seats on the case. Replace the race retaining ring.

5. Replace the cork washers and oil



Main drive gear

- | | | |
|---------------------------------------|-----------------------------|---------------------------------|
| 1. Sprocket lock nut | 6. Thrust washer | 11. Main drive gear spacer key |
| 2. Sprocket lock washer | 7. Roller bearings (44) | 12. Bearing race retaining ring |
| 3. Oil deflector | 8. Main drive gear oil seal | 13. Bearing race |
| 4. Chain sprocket | 9. Oil seal cork washer | 14. Gear box |
| 5. Main drive gear | 10. Main drive gear spacer | 15. Main drive gear bushing |
| 5A. Main drive gear shaft seal (1965) | | |

seals. Apply sealer to the gear end recess when replacing the shaft seal.

6. Replace the shifter clutches and gear engaging dogs for wear or damage, and replace if necessary. Edges should be sharp rather than rounded.

7. Check bearings for smooth operation and proper fit in their races. Specifications are listed in the "Transmission Specifications" chart. Rollers are available in 0.0004 and 0.0008 in. oversizes and must be replaced as a set.

ASSEMBLY

1. Assemble the main drive gear oil seal, cork washer, and gear spacer in the case.

2. Install and grease the bearing race and install the rollers.

3. Assemble the main drive gear thrust washer on the main drive gear and slip the gear into the bearing race, taking care not to displace any rollers.

4. Install the main drive gear spacer key in its slot in the outer edge of the gear spacer, with the long section in any gear splineway.

5. Slip the sprocket, with the flat side away from the case, onto the gear splines. Assemble the oil deflector and lockwasher; secure the locknut.

6. Using a dial indicator, check end-play as listed in the "Transmission Specifications" chart.

Mainshaft Assembly

1. Assemble First and Second (or First and Reverse gear depending on the model) gears on the splines, mainshaft bearing housing, bearing, bearing washer, and the bearing nut to the mainshaft.

2. Press the bearing housing over the mainshaft ball bearing, press onto the shaft, and secure with the lockwasher and nut. Bend the washer ear against the nut.

3. Insert the shaft into the gearbox and install the mainshaft Third gear (Second gear on three-speed models), thrust washer, locking and shifter clutch with the "high" side facing the drive gear.

4. Seat the lockring in its groove on the shaft.

5. Gently tap the shaft assembly into the case with a soft metal hammer or brass drift until the bearing housing flange seats against the case.

6. Install the Reverse idler gear on three-speed models.

7. Assemble and secure the retaining plate, oil deflector, and retaining plate screws.

Countershaft Assembly

1. Insert the lockrings and bearing retainer washers in the countershaft gear.

2. Apply grease to the inside of the

countershaft gear and assemble both roller sets.

3. Install the bearing thrust washer in the gear end.

4. Temporarily install the shaft to check bearing end-play and motion. Consult the "Transmission Specifications" chart for necessary information.

5. Apply a dab of heavy grease to the gear end washer and mount it, and the gear, in the case.

6. Check gear end-play by inserting a thickness gauge between the gear and washer. Consult the "Transmission Specifications" chart for proper clearance and adjust with the appropriate number of washers. (0.074, 0.078, 0.082, 0.085, 0.090, 0.095, and 0.100 in. washers are available.) When the correct amount of washers is arrived at, set aside the shaft, gear, and gear end washer.

7. Assemble the Second gear bushing, gear, thrust washer, and gear locking on the countershaft gear.

8. Assemble the shifter clutch, thrust washer, first gear bushing, and gear on the countershaft gear.

9. Apply a dab of heavy grease to the countershaft gear end washer and place it on end of the gear.

10. Hold the assembly in the case and insert the countershaft. Secure the bearing lockwasher and nut, and bend up an ear of the washer.

11. Install the drive unit gasket, drive unit, washer, and screw.

12. Consult the "Shifter Cover Replacement," "Starter," and "Clutch Assembly" sections for completion procedures.

13. Install the transmission and follow the procedures given in "Transmission Removal" section.

Starters

The kick-starter mechanism is sturdily designed and requires no special attention. If, however, any problem does arise, it is imperative that the engine be shut down immediately and not used until the difficulty is corrected.

Clicking noises from the starter gears are an indication of trouble. This will

occur with the engine running and the starter crank in its proper position, and is caused by the starter clutch teeth. Tightening down the starter shaft nut on the crank gear camplate will often solve the problem.

Slipping, or partial engagement of the starter crank during its cycle, indicates either broken or worn starter clutch teeth, a damaged clutch spring, sticking of the clutch gear on the sprocket spacer, or a worn brass fitting.

SPORTSTER

Disassembly

1. Loosen the front cylinder and exhaust pipe.

2. Remove the starter crank clamp bolt and pry the crank free of the shaft.

3. Apply pressure to the end of the starter spring and pry it free of the shaft.

4. Remove the sprocket cover bolts and lightly tap off the cover with a soft mallet while pulling it from the shaft.

5. Push the clutch lever forward and disengage the cable.

6. Remove the clutch as described in the "Clutch Disassembly" section.

7. Free the starter clutch gear, sprocket spacer, and clutch spring by rotating the crank gear.

8. Remove the shaft nut and crank gear lockwasher.

9. Loosen the starter crankshaft from the crank gear by tapping the shaft end with a soft mallet.

10. Slide out the crankshaft, oil seal, shims, and thrust plate.

Inspection

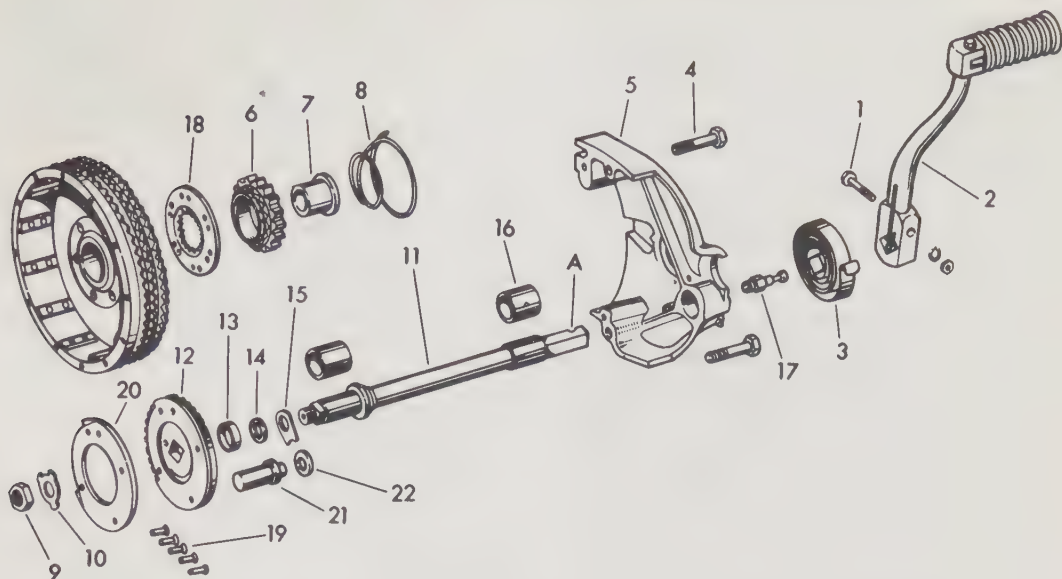
1. Clean all parts with a suitable solvent, except for the cover gasket if it is to be reused, and blow them dry.

2. Inspect the starter clutch and starter clutch gear for worn or damaged teeth, and replace if necessary.

3. Spin the clutch gear on the spacer and check for binding. Replace any damaged parts.

4. Replace the starter clutch spring if the length is under 1 in., in a free state, or if it is extremely fatigued.

5. Check the starter crankshaft for distortion. Check for excessive wear on the surfaces of the bearing and on the faces of



Kick-starter assembly

- | | | |
|--|-------------------------------|------------------------------------|
| 1. Crank clamp bolt, lock washer | 8. Clutch spring | 16. Shaft bushing (2) |
| 2. Crank and pedal assembly | 9. Shaft nut | 17. Spring stud |
| 3. Crank spring | 10. Crank gear lock washer | 18. Starter clutch |
| 4. Sprocket cover bolt (2) | 11. Crankshaft | 19. Crank gear cam plate rivet (5) |
| 5. Sprocket cover | 12. Crank gear | 20. Crank gear cam plate |
| 6. Starter clutch gear | 13. Crank oil seal | 21. Crank gear stop pin |
| 7. Clutch sprocket spacer available
(long or short) | 14. Crankshaft shim—0.007 in. | 22. Crank gear stop pin washer |
| | 15. Shaft thrust plate | |

the thrust washer and shaft collar. Replace if necessary.

6. Temporarily mount the following assembly in the left crankcase: crankshaft, oil seal, thrust plate, crank gear, lockwasher, and shaft nut, checking all parts for wear and replacing as necessary.

7. Spin the shaft and measure for excessive end-play with a dial indicator. End-play must be within 0.001–0.007 in. Shims which are 0.007 in. thick are available (H-D Part No. 6802).

8. Inspect the starter crank gear for wear or damage, especially to the ears. The camplate can be replaced independently of the crank gear.

10. Check to make sure that the camplate rivets are all secure.

11. Replace the bushings if excessive end-play is present but the shaft is not worn. Press the old bushing out and the new one in taking care to align the bushing hole with the grease-fitting channel.

12. Only inspect or replace the gear stop pin and washer if the engine is not in the chassis. These parts rarely need service. The pin is a press fit and the washer is secured by peening the pin end.

Assembly

1. Insert the oil seal into the crankcase.

2. Slide the thrust washer onto the countershaft with the flat side up.

3. Assemble the shim on the shaft (if applicable) and insert the shaft in the crankcase so that the thrust washer notch lines up with the stop pin.

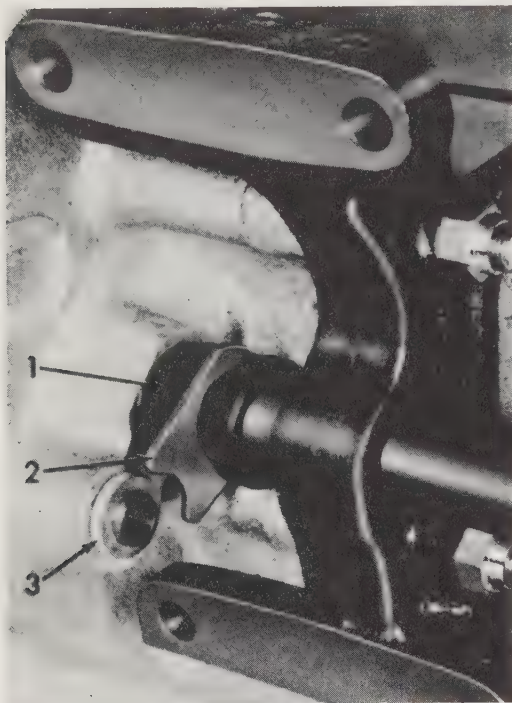
4. Rotate the crank until the notch on the outer end of the shaft is pointing up.

5. Place the starter gear on the shaft end with the recessed portion of the camplate facing down. The slot should seat against the stop pin. Check to make sure that the thrust washer has not shifted out of place.

6. Install the lockwasher over the shaft so that its prong engages the hole in the crank gear face, and secure it with the flat side of the shaft nut against the washer.

7. Slip the spacer into the starter gear so that the grooved side of the gear bushing seats on the spacer lip.

8. Align the clutch spring small end in the gear bushing groove.



Starter crankshaft installation

1. Starter crankshaft shim—0.007 in.
2. Starter shaft thrust plate
3. Starter crank gear stop pin washer

9. Press the starter gear into mesh with the starter clutch, and rotate the crank gear so that the clutch gear and crank gear also mesh. The spring will hold the assembly in place once the cover is installed.

10. Rotate the crank gear to its original position. By taking a strip of metal and drilling holes to match the cover screw securing holes, the strip can be mounted to temporarily hold the spring in position until the cover is mounted.

11. When replacing a sprocket spacer, make sure that you use one of the same length. If new gears are used, the clearance between the teeth must be checked in the following manner:

- a. Measure the distance from the spacer collar to the top of the clutch gear teeth.

- b. Measure the distance from the top of the clutch gear teeth to the sprocket washer.

- c. Subtract the answer of "b" from that of "a" to get the proper clearance.

- d. Use a long spacer if the result is less than 0.040 in. after a small spacer has already been used.

12. Install the clutch as described in the "Clutch Assembly" section.

13. Secure the clutch cable end in the release lever, and mount and secure the sprocket cover, exhaust pipe, and muffler.

14. Place the crank spring on the shaft end with the spring end pointing upward. Secure the spring on the spring stud by prying with a screwdriver.

15. Mount and secure the starter crank.

GLIDE MODELS

Disassembly

1. Place a drip pan under the transmission.

2. Remove the clutch lever rod from the release lever, cover nuts and washers, and pull the cover and release lever assembly free from the mounting studs.

3. The clutch release bearing should come off with the cover, but may bind on the starter clutch. Do not attempt to pry it from the cover, but it may be pried free from the clutch.

4. Pull the pushrod free of the mainshaft.

5. Secure the crank with a vise or vise grips which are blocked against movement.

6. Bend the lockwasher ear from the crank nut and remove both the nut and the washer.

7. Pull the starter gear with a claw puller or remove the vise and drive the crank free with a soft mallet. Block the crank and cover against swinging when the shaft is free from the gear.

8. Pull the crank out of the cover and the crank spring, thrust washer, crank bushings, and oil seal will all come free.

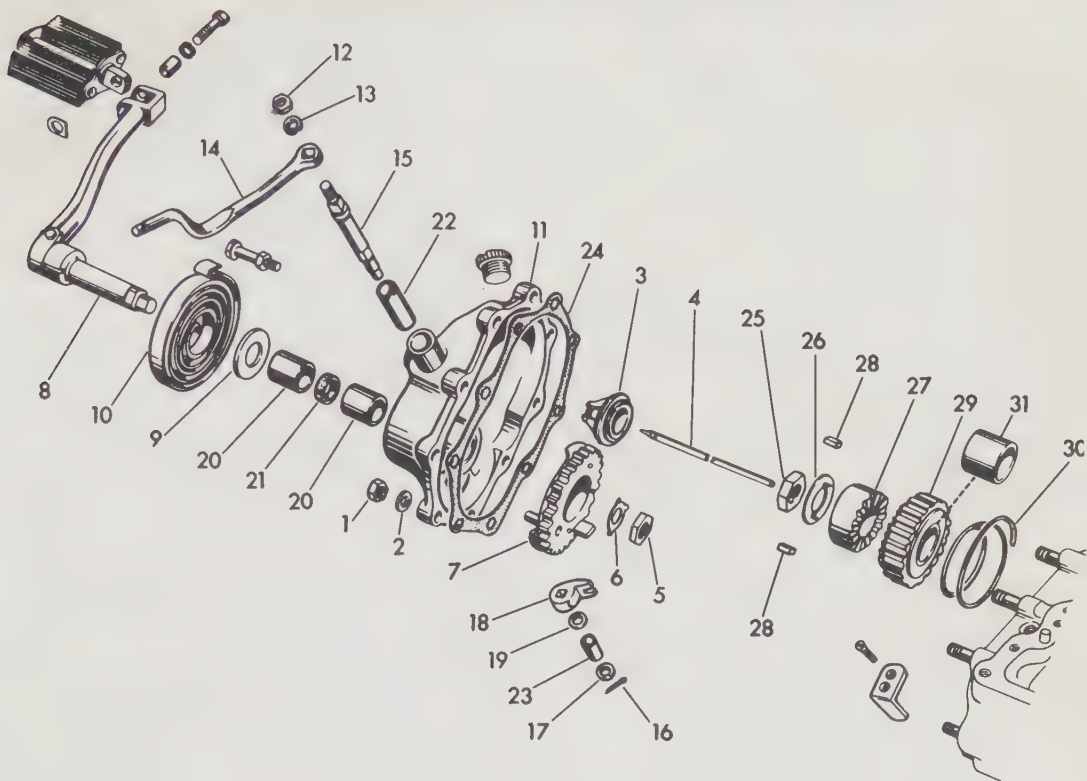
9. Remove the release lever nut and lockwasher, and pull the release lever free with a claw puller.

10. Remove the release finger and thrust washer by removing the cotter pin and washer; pull the shaft free.

Inspection

1. Clean all parts with a suitable solvent and blow them dry.

2. Check play between the starter crankshaft and the cover bushing, and replace if play is excessive. Press new



Kick-starter assembly

- | | | |
|---------------------------|-------------------------------|----------------------------|
| 1. Starter cover nut (9) | 12. Release lever nut | 23. Release lever bushing |
| 2. Plain washer (9) | 13. Lock washer | 24. Starter cover gasket |
| 3. Clutch release bearing | 14. Release lever | 25. Starter clutch nut |
| 4. Push rod | 15. Release lever shaft | 26. Starter clutch washer |
| 5. Starter crank nut | 16. Cotter pin | 27. Starter clutch |
| 6. Eared lock washer | 17. Plain washer | 28. Starter clutch key (2) |
| 7. Starter gear | 18. Release finger | 29. Starter mainshaft gear |
| 8. Crank | 19. Thrust washer | 30. Starter clutch spring |
| 9. Thrust washer | 20. Starter crank bushing (2) | 31. Mainshaft gear bushing |
| 10. Starter crank spring | 21. Oil seal | |
| 11. Starter cover | 22. Release lever bushing | |

bushings in until they are flush with the outer surface.

3. Replace the oil seal if the transmission was leaking through the starter crank.

4. Check for play in the release lever shaft. Replace the shaft if play is excessive.

5. Inspect the pushrod bearing for wear and replace it if the action is not smooth or is excessively loose.

6. Inspect the crank gear camplate and gear pin for wear. This is all assembled on the starter crank gear and is probably worn if the bushings were worn.

Assembly

1. Assemble the release lever shaft, lever bushing, release finger, thrust

washer, lever bushing, washer, and cotter pin on the starter cover.

2. Press the crank bushing and oil seal in the cover after lightly greasing the seal.

3. Assemble the crank spring and the thrust washer (with beveled side facing spring), and insert the crank after lightly greasing the shaft.

4. Block the crank with a vise and wind the spring by rotating the cover clockwise.

5. With the crank held in normal position, install the crank gear so that the gear will maintain normal crank position.

6. Secure the crank with the lock-washer and nut, bending the washer ear against a flat side of the nut.

7. Install a new gasket on the case

studs after applying gasket sealer or silver spray.

8. Install the clutch release bearing into the cover so that the slot in the bearing race engages the clutch release lever finger.

9. Slide the pushrod's narrow end into the bearing.

10. Slide the cover into place making sure the pushrod enters the main shaft.

11. The starter clutch ball plunger and the groove in the release bearing inner race must be aligned.

12. Secure the cover.

13. Fill the case with 1½ pts of oil of the same viscosity as that used in the engine.

Starter Clutch

DISASSEMBLY

1. Remove the starter clutch cover assembly as described in the "Starter Disassembly" section.

2. Bend the lockwasher ear free of the clutch nut and remove both parts.

3. Pull the starter clutch from the mainshaft with Starter Clutch Puller (H-D Part No. 95650-42), or a suitable substitute, taking care not to damage the clutch teeth.

4. Remove the starter clutch keys, mainshaft gear, and clutch spring.

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry, except for the cover gasket if it is to be reused.

2. Inspect the starter clutch, mainshaft gear, starter gear teeth, mainshaft gear, and starter clutch ratchet teeth. Replace if the teeth are rounded, mushroomed, chipped, or cracked.

3. Examine the mainshaft gear bushing and replace if necessary.

ASSEMBLY

Assemble in reverse order of disassembly. Note the following:

1. Replace the gasket if possible. Apply sealer to the case side of the gasket and position it on the case.

2. Rotate the mainshaft gear to ensure free motion and ream the bushing if necessary.

3. Drive the keys into the slots.

4. Secure the starter clutch nut and

bend the lockwasher ear against a nut flat side. The top of the starter clutch must never be less than ⅝ in. above edge of the gearbox. If overtightened, the starter clutch may crack, causing damage to the bearing.

ELECTRIC STARTER DRIVE

1966 and Later Sportster, and Glide Models

Harley-Davidson uses a Bendix-type drive assembly. When the starter button is depressed, the solenoid withdraws its plunger, causing the pinion shifter lever to pivot on its base. The arm of the lever rides in the shifter collar and the pivoting action causes the pinion gear to move along the shaft. Rather than a worm sleeve, the shaft itself has special threads which are constantly meshed with the threads in the pinion gear.

At the same time the plunger is withdrawn, the solenoid completes the starter motor circuit which rotates the starter shaft. When the pinion gear reaches the collar of the starter shaft nut, it stops and engages the clutch gear. The spiral threads allow the pinion gear to back off if it doesn't mesh properly.

When the button is released, the plunger again shifts the lever so the pinion gear resumes its inoperative position and the starter motor circuit is broken. The clutch gear is a one-way clutch which will allow the starter shaft to spin independently of the engine through a ratcheting action. This means that if you don't release the button after the engine starts, no damage will occur to the starter or the starter drive mechanism.

SOLENOID AND STARTER DRIVE SHAFT DISASSEMBLY

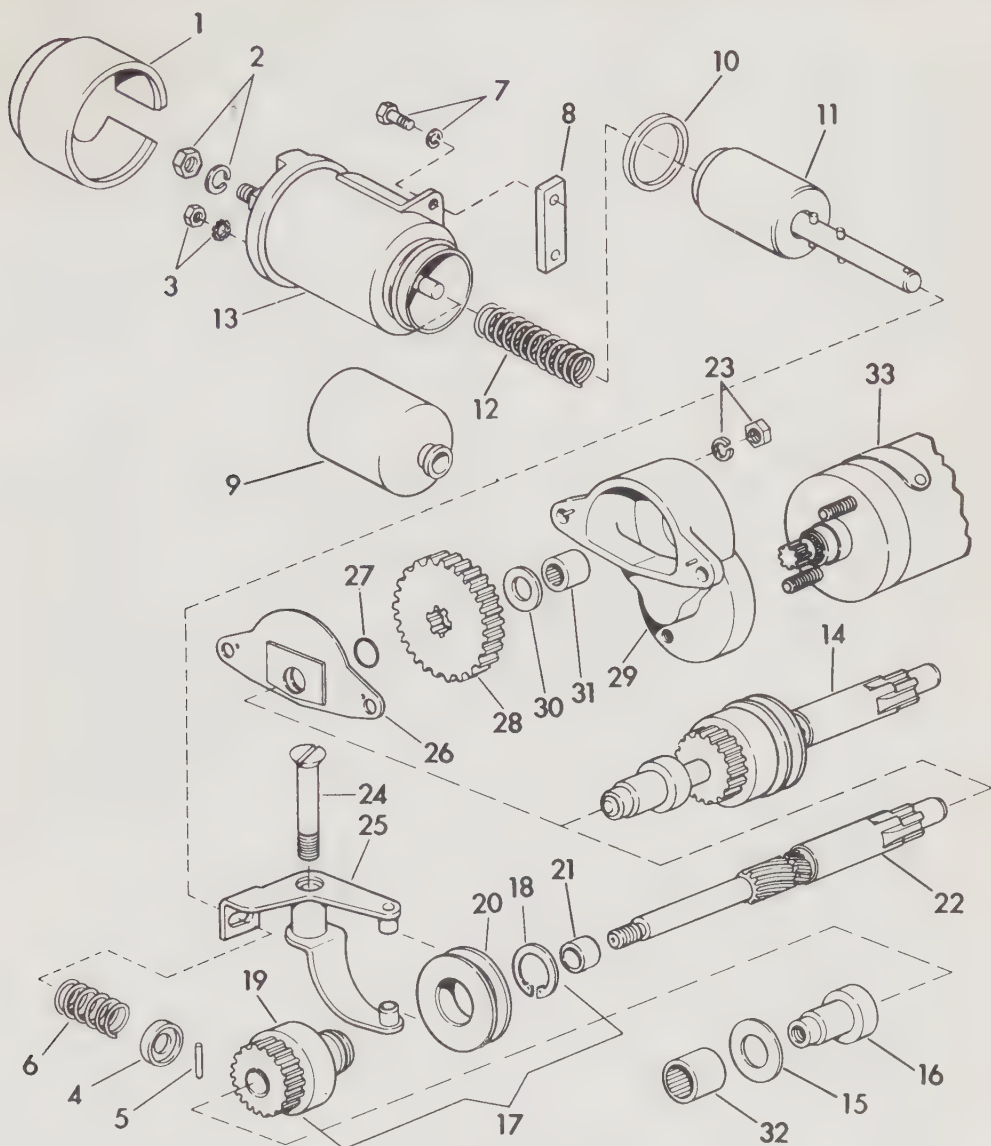
1. Disconnect the battery ground wire from the negative terminal post.

2. Remove the nuts and lockwashers from the solenoid terminals and disconnect the wires.

3. Remove the drive housing end cover bolts, lockwashers, and end cover.

4. Press on the solenoid shaft pin retainer cup, and remove the shaft retainer pin and the plunger shaft spring.

5. Remove the solenoid securing bolts, lockwashers, spacer bar, and solenoid assembly.



Electric starter shaft, housing, and solenoid

- | | | |
|------------------------------------|--|----------------------------|
| 1. Cover | 13. Solenoid | 22. Shaft |
| 2. Terminal nut and lockwasher (2) | 14. Pinion gear and shaft assembly | 23. Nut and lockwasher (2) |
| 3. Terminal nut and lockwasher | 15. Thrust washer (1971 & earlier) | 24. Shifter lever screw |
| 4. Retainer cap | 16. Pinion shaft nut | 25. Shifter lever |
| 5. Pin | 17. Pinion and shifter collar assembly | 26. Oil deflector |
| 6. Spring | 18. Lock ring | 27. Oil deflector O-ring |
| 7. Bolt and lockwasher (2) | 19. Pinion gear | 28. Drive gear |
| 8. Spacer bar | 20. Shifter collar | 29. Starter shaft housing |
| 9. Boot | 21. Spacer | 30. Washer |
| 10. Gasket | | 31. Needle bearing |
| 11. Plunger | | 32. Needle bearing |
| 12. Plunger spring | | 33. Starter motor |

6. Remove the solenoid boot, plunger, and plunger spring.

7. Remove the pinion shifter lever screw and lift the lever free.

8. Remove the starter drive shaft assembly.

9. Place the drive gear in a wood or copper-lined vise and remove the shaft

nut. This must be done with rubber or cloth between the jaws of a vise grip, or something similar, so that nut is not marred or distorted. The nut has a left-hand thread.

10. Slip the pinion gear and shifter collar from the shaft.

11. Using snap-ring pliers, remove the shift collar retaining ring and separate the pinion gear from the shifter collar.

12. Slip the spacer from the shaft.

13. Bushings are a press fit and should be removed only if they are to be replaced.

SOLENOID STARTER DRIVE SHAFT
INSPECTION AND REPAIR

- 1. Clean all parts in a suitable solvent and blow them dry.
- 2. Inspect all parts for excessive wear

and replace as necessary. Pay special attention to all gear and pinion teeth. Complete assemblies are available as well as individual parts.

3. Check the bushings for excessive play and replace if necessary.

4. Repack the needle bearings with grease and press-fit them until they are flush with the outside of the housing.

5. Replace, if possible, the collar retaining ring if it has been removed.

6. Consult the "Starter Motor" section for starter motor servicing instructions.

SOLENOID AND STARTER
DRIVE SHAFT ASSEMBLY

Assemble in reverse order of disassembly. Note the following:

- 1. Lightly lubricate the bearings with heavy grease.

Engine Specifications

	Sportster	Glide Models
VALVES		
Fit in guide (EX) (loose)	0.0025–0.0045 in.	0.004–0.006 in.
Fit in guide (IN) (loose)	0.0015–0.0035 in.	0.002–0.004 in.
Spring (outer)		
valve closed	52–62 lbs at 1 $\frac{9}{32}$ in.	
valve open	155–165 lbs at 1 $\frac{5}{16}$ in.	①
Spring (inner)		
valve closed	30–35 lbs at 1 $\frac{3}{32}$ in.	②
valve open	75–85 lbs at $\frac{3}{4}$ in.	③
Spring free length	1 $\frac{1}{2}$ in. (outer) 1 $\frac{23}{64}$ in. (inner)	
ROCKER ARM		
Fit in bushing (loose)	④	0.0005–0.002 in.
End clearance	0.0003–0.0005 in.	0.004–0.025 in.
PISTON		
Fit in cylinder (loose)	0.0025–0.003 in.	0.001–0.002 in.
Ring gap	⑤	0.010–0.020 in.
Compression ring side clearance	⑥	0.004–0.005 in.
Oil ring side clearance	0.003–0.005 in.	0.003–0.005 in.
Piston pin fit	Light hand press at 70 degrees Fahrenheit	
CONNECTING ROD		
Piston pin fit (loose)	0.00008–0.0012 in.	0.0008–0.0012 in.
End play between flywheels	0.006–0.010 in.	⑦
Fit on crank pin	⑧	⑨
OIL FEED PUMP PRESSURE		
Minimum	6 psi at 20 mph	25 psi at 20 mph
TAPPETS		
Guide fit in crankcase (press)	0.0005–0.001 in.	0.002 in. (tight) 0.002 in. (loose)
Fit in guide (loose)	0.0005–0.001 in.	0.001–0.002 in.
Roller fit	0.005–0.001 in.	0.0005–0.001 in.
Roller end clearance	0.008–0.010 in.	0.008–0.010 in.
GEAR CASE		
Intermediate gear shaft in bushing	0.0005–0.001 in.	—
Intermediate (idler) gear on shaft (loose)	—	0.001–0.0015 in.

Engine Specifications (cont.)

	<i>Sportster</i>	<i>Glide Models</i>
GEAR CASE		
Cam gear shaft in bushing	0.0005–0.002 in.	0.001–0.0015 in.
Cam gear shaft in needle bearing	0.0005–0.0025 in.	0.0005–0.003 in.
Cam gear shaft end-play	—	0.001–0.005 in.
Cam gear backlash	0.0002–0.005 in.	—
Timer gear end-play	—	0.003–0.007 in.
Idler gear end-play	—	0.003–0.020 in.
Breather gear end-play	—	0.001–0.005 in.
Oil pump driveshaft (crankcase bushing)	—	0.0008–0.0012 in.
FLYWHEEL ASSEMBLY		
Gear shaft nut torque	(10)	(11)
Sprocket shaft nut torque	(12)	(13)
Crankpin nuts torque	150 ft lbs	(14)
Run-out (flywheels) (at rim)	(15)	0.003 in. maximum
Run-out (mainshafts)	(16)	0.001 in. maximum
End-play in crankcase	—	—
SPROCKET SHAFT BEARING		
Cup fit in crankcase (press fit)	0.005–0.0025 in.	0.0015–0.0035 in.
Cone fit on shaft (press fit)	0.0002–0.0012 in.	0.0002–0.0015 in.
End-play	0.001–0.010 in.	0.005–0.006 in.
Shaft fit in bearing (loose)	—	—
Fit in oil return bushing	—	—
PINION SHAFT BEARING		
Shaft fit in roller bearing (loose)	(17)	0.0004–0.0008 in.
Shaft fit in cover bushing (loose)	(18)	0.0005–0.0012 in.

① Spring (outer)

FL Model

valve closed: 55–65 lbs at $1\frac{1}{32}$ in.valve open: 110–120 lbs at $1\frac{1}{16}$ in.

FLH Model

valve closed: 105–115 lbs at $1\frac{3}{8}$ in.

valve open: 180–190 lbs at 1 in.

② Spring (inner)

FL Model

valve closed: 25–35 lbs at $1\frac{1}{4}$ in.valve open: 70–80 lbs at $\frac{29}{32}$ in.

FLH Model

valve closed: 20–30 lbs at $1\frac{1}{16}$ in.valve open: 70–80 lbs at $\frac{5}{16}$ in.

③ Spring free length

FL Model: $1\frac{1}{16}$ in. (outer) $1\frac{1}{32}$ in. (inner)FLH Model: $1\frac{1}{32}$ in. (outer) $1\frac{3}{64}$ in. (inner)

④ Fit in bushing (loose)

1971 and earlier: 0.0005–0.002 in.

1972 and later: 0.001–0.0025 in.

⑤ Ring gap

1971 and earlier: 0.010–0.020 in.

1972 and later: 0.015–0.025 in.

⑥ Compression ring side clearance

1971 and earlier: 0.025–0.004 in.

1972 and later: 0.0035–0.005 in.

⑦ Fit on crank pin (loose)

1971 and earlier: 0.0008–0.001 in.

1972 and later: 0.0005–0.001 in.

⑧ End play between flywheel

1971 and earlier: 0.006–0.010 in.

1972 and later: 0.005–0.025 in.

⑨ Fit on crank pin

1959 and earlier: 0.001–0.0015 in.

1960–1971: 0.0006–0.001 in.

1972 and later: 0.001–0.0015 in.

⑩ Gear shaft nut torque

1971 and earlier: 100 ft lbs

1972 and later: 150 ft lbs

⑪ Gear shaft nut torque

1971 and earlier: 100 ft lbs

1972 and later: 170 ft lbs

⑫ Sprocket shaft nut torque

1971 and earlier: 100 ft lbs

1972 and later: 150 ft lbs

⑬ Sprocket shaft nut torque

1969 and earlier: 100 ft lbs

1970–1971: 170 ft lbs

1972 and later: 400 ft lbs

⑭ Crank pin nuts torque

1971 and earlier: 175 ft lbs

1972 and later: 200 ft lbs

⑮ Run-out (flywheel at rim)

1971 and earlier: 0.002 in. maximum

1972 and later: 0.003 in. maximum

⑯ Run-out (mainshafts)

1971 and earlier: 0.002 in. maximum

1972 and later: 0.001 in. maximum

⑰ Shaft fit in roller bearing (loose)

1971 and earlier: 0.0008–0.001 in.

1972 and later: 0.005–0.0015 in.

⑱ Shaft fit in cover bushing (loose)

1971 and earlier: 0.0005–0.0012 in.

1972 and later: 0.0005–0.0015 in.

2. Secure the shaft nut with a thread-locking sealer.

3. Spin the assembled shaft in the bearings to check for free movement. This will indicate whether or not the shaft nut was distorted during removal.
4. Stake the starter shaft housing washer.

5. Secure the battery cable and two red wires to the solenoid "top" terminal. Consult the "Wiring Diagram" section if in doubt.

Transmission Specifications

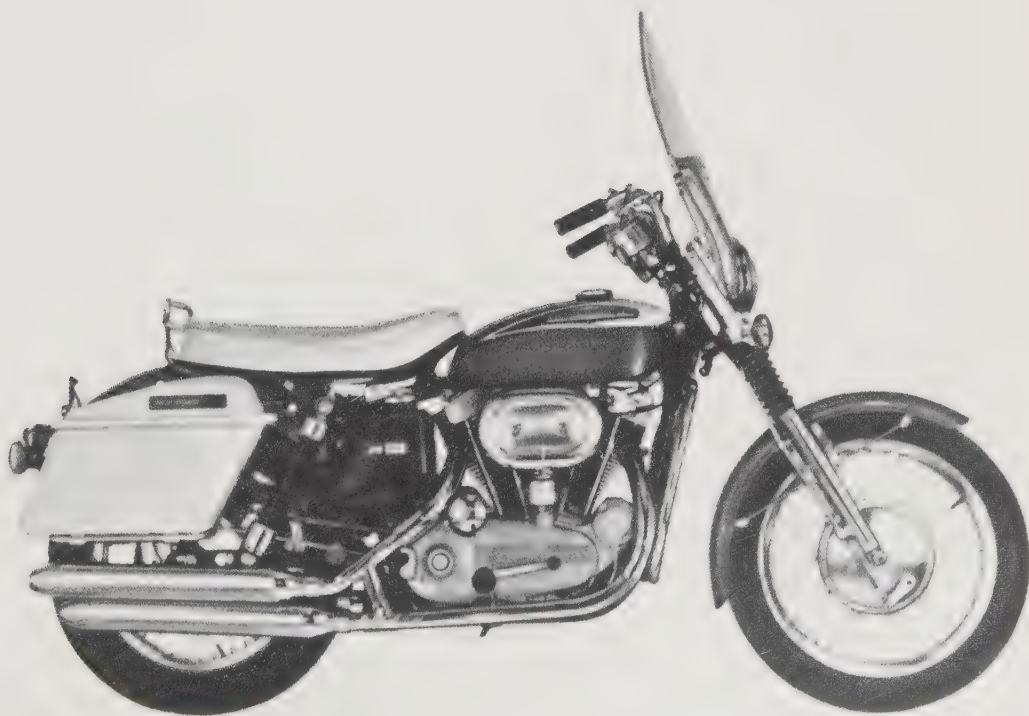
	<i>Sportster</i>	<i>Glide Models</i>
CLUTCH		
Type	①	Dry multiple disc
Capacity (torque)	1900 in./lbs	②
Spring Pressure (total)	③	④
Bearing fit (loose)	0.0005–0.002 in.	0.002–0.003 in.
Clutch release rod reply movement	1⁄8 in.	3⁄8–5⁄8 in.
CHAIN		
Primary (type)	3⁄8 in. pitch, triple	1⁄2 in. pitch, double
Slack	5⁄8–7⁄8 in. (cold)	5⁄8–7⁄8 in. (cold)
	3⁄8–5⁄8 in. (hot)	3⁄8–5⁄8 in. (hot)
STARTER		
Minimum clearance between starter clutch gear teeth and clutch	0.040 in. (crank in up position)	—
Crankshaft end-play	0.001–0.007 in.	—
GEAR BOX		
Shifter mechanism	Free operation in all positions	—
Cam end-play	—	0.005–0.0065 in.
MAIN AND COUNTERSHAFT GROUPS		
Clutch gear end-play (loose)	0.001–0.002 in.	—
Clutch gear outer bearing (loose)	0.0001–0.0017 in.	—
Clutch gear inner bushing	—	—
Clutch gear ball bearing	0.0001 in. (loose)	—
	0.0009 in. (tight)	—
Low gear bushing (on shaft)	0.0005–0.00016 in.	0.000–0.0015 in. (loose)
(in gear)	—	0.0005–0.0025 in. (loose)
(end-play)	0.004–0.009 in.	—
Low gear end bearing (loose)	—	0.005–0.002 in.
(end-play)	—	0.008–0.012 in.
(in housing)	⑤	—
(on shaft)	⑥	—
(housing in case)	⑦	—
Second gear bushing (on shaft)	0.001–0.0025 in. (loose)	0.000–0.0015 in. (loose)
(in gear)	—	0.0005–0.0025 in. (loose)
(end-play)	—	0.003–0.017 in.
Third gear bushing (on shaft) (loose)	0.002–0.003 in.	0.001–0.002 in.
(in gear)	—	press fit
(end-play)	0.015–0.025 in.	0.000–0.017 in.
Reverse gear and bearing (mainshaft)	—	—
(countershaft)	—	—

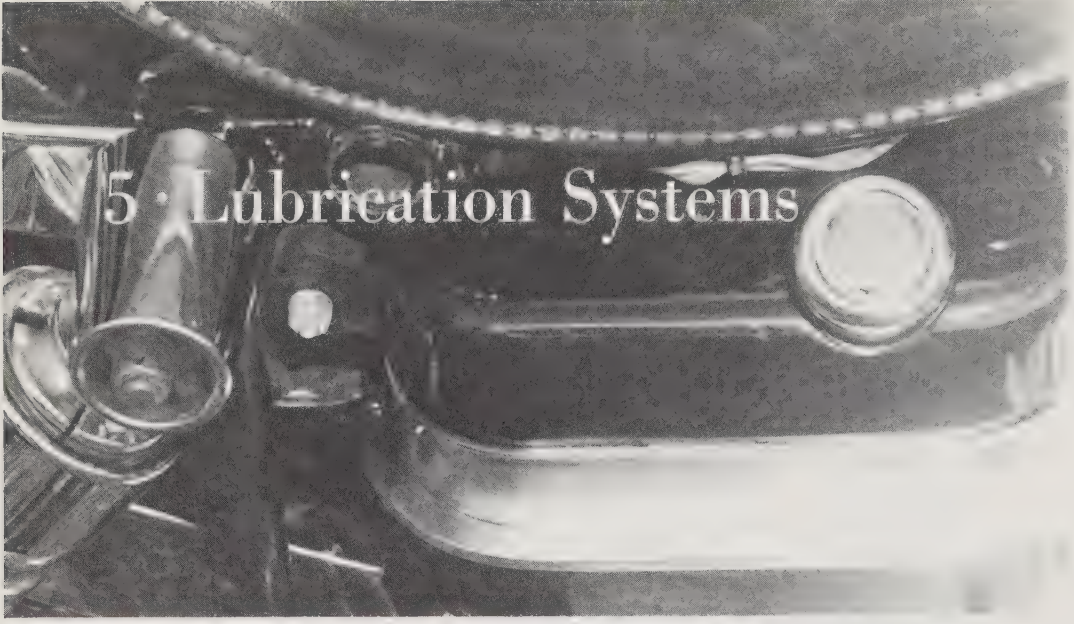
Transmission Specifications (cont.)

	<i>Sportster</i>	<i>Glide Models</i>
MAIN AND COUNTERSHAFT GROUPS		
Reverse gear bushing (on shaft)	—	—
(in gear)	—	—
High gear end bearing (inner)	—	—
Drive gear (on shaft)	0.0005–0.003 in. (loose)	—
roller bearing (loose)	—	0.0005–0.002 in.
inner bearing	—	0.002–0.003 in.
end-play	—	0.003–0.013 in.

- ① Clutch type
1970 and earlier: dry multiple disc
1971 and later: wet multiple disc
- ② Clutch capacity
1970 and earlier: 284 ft lbs
1971 and later: 206 ft lbs
- ③ Spring pressure
1970 and earlier: 150 lbs
1971: 234 lbs
1972 and later: 257 lbs
- ④ Spring pressure
1970 and earlier: 475 lbs
1971 and later: 315 lbs

- ⑤ Low gear end bearing in housing
1970 and earlier: snug fit
1971 and later: 0.0015 in. (loose)–0.0001 in. (press)
- ⑥ Low gear bearing on shaft
1970 and earlier: light press
1971 and later: 0.0001 in. (loose)–0.0010 in. (press)
- ⑦ Low gear end bearing housing in case
1970 and earlier: light press
1971 and later: 0.0005 in. (loose)–0.0010 in. (press)





5 Lubrication Systems

Oil Pump

Sportster and Glide models have both feed-type and scavenger gear-type pumps incorporated in one pump body.

Oil pumps are long-life units which seldom require repair. Therefore, one should check all related possibilities which might contribute to a "light-on" or "no-pressure" situation before disassembling the pump.

SPORTSTER

Oil Pump Check Valve Disassembly

1. Clean the pump surface and its surrounding area thoroughly with a suitable solvent and blow it dry.

2. Disconnect the oil pressure switch wire and remove the switch, oil pump nipple, check valve spring, and ball valve.

Oil Pump Check Valve Inspection

1. Clean all parts in a suitable solvent and blow them dry. Blow out the nipple oil passage and the spring guide.

2. Inspect the nipple and spring for free-motion, wear, and damage, and replace if necessary. Spring free-length should be $1\frac{15}{64}$ in.

3. Inspect the nipple threads and replace them if they are worn or damaged.

4. Replace the valve balls if they are ringed or are not perfectly smooth.

5. Inspect the ball valve seat for a clean and smooth condition. Slight pitting or striation marks can sometimes be removed by gently tapping with a suitable drift. Replace the pump body if such defects can not be corrected.

Oil Pump Check Valve Assembly

1. Assemble in the reverse order of disassembly.

2. All of the parts must be absolutely clean.

3. Lightly oil all of the moving parts.

4. Check for free ball action and seating.

Oil Pump Disassembly

1. Remove the engine from the frame as described in "Engine Removal."

2. Clean the pump surface and its surrounding areas thoroughly with a suitable solvent and blow it dry.

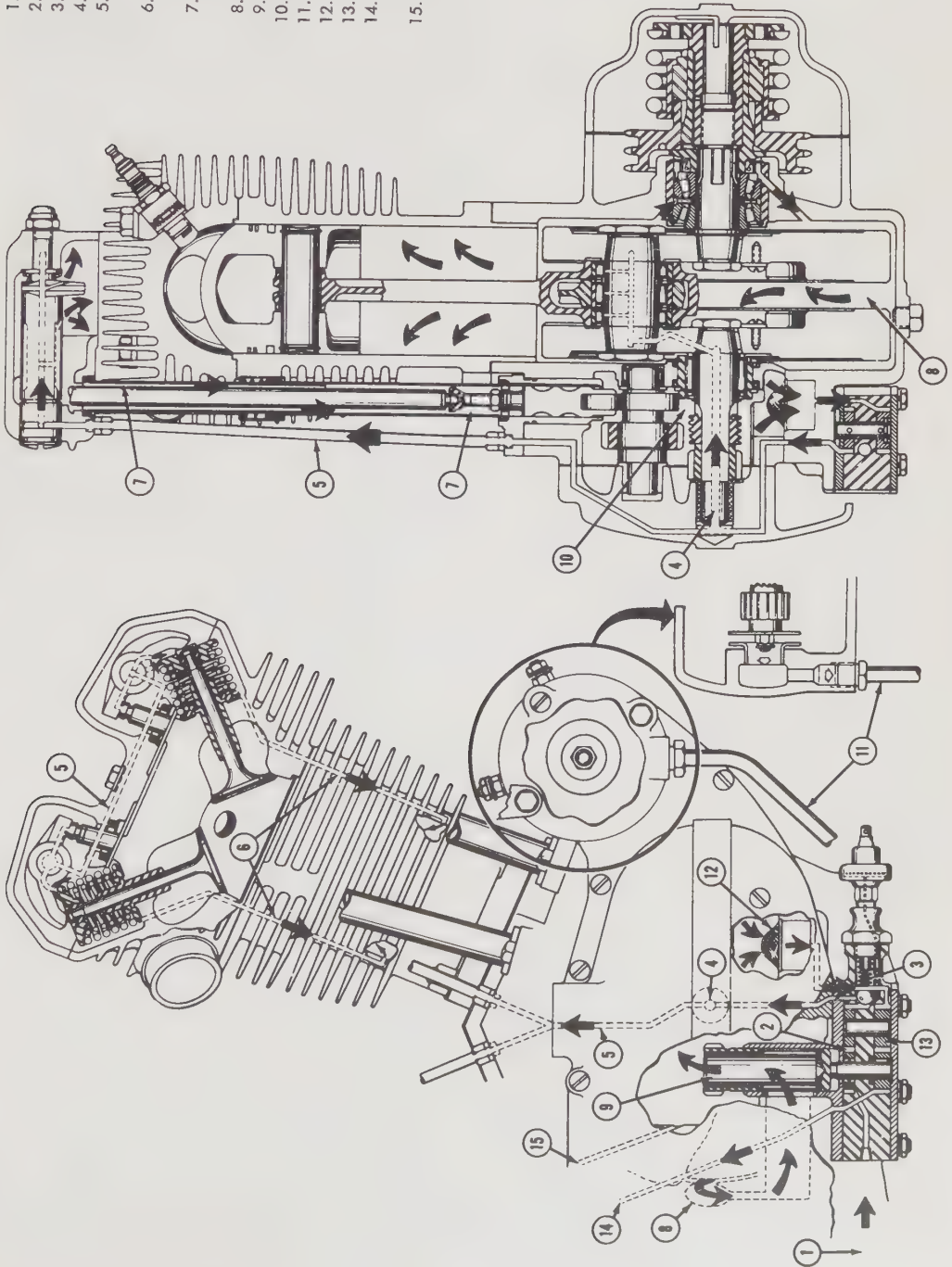
3. Remove the crankcase stud nuts and the assembled pump. Tap with a hammer on a piece of brass or wood, held on the breather sleeve, to loosen it if necessary.

4. Disassemble the check valve as described in "Oil Pump Check Valve Disassembly."

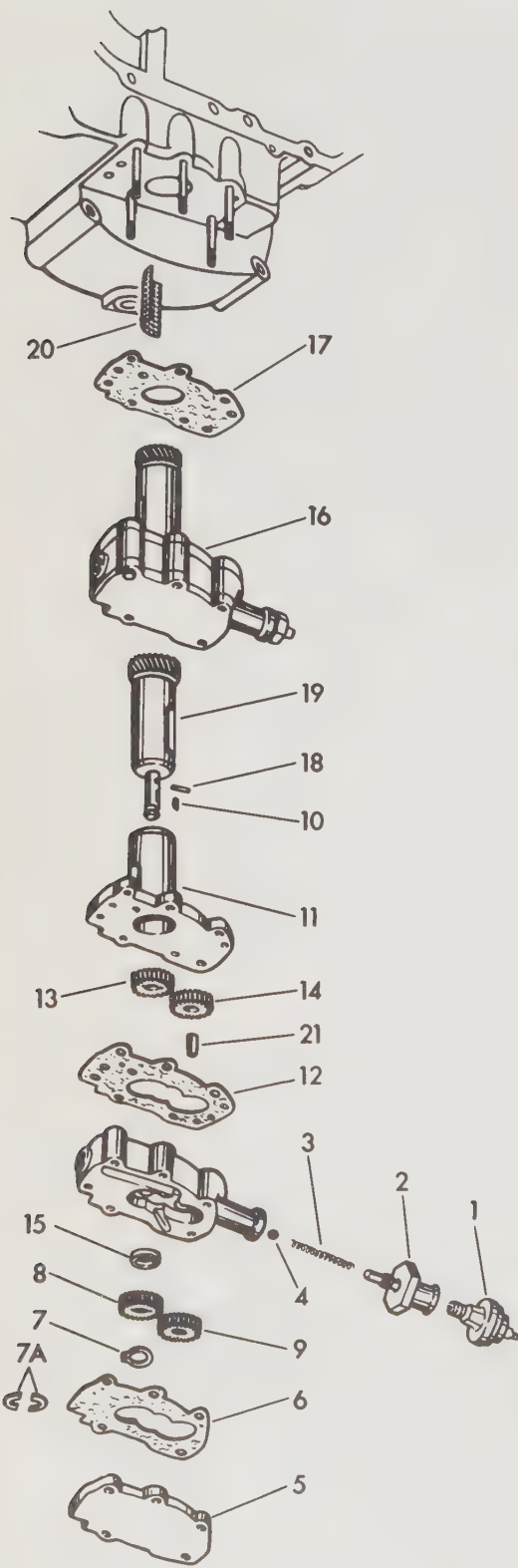
5. Remove the oil pump body plate and the body plate gasket.

6. Remove the retaining rings with

1. Oil flow into the pump
2. Pump feed section
3. Check valve
4. Pinion gear shift
5. Lubrication path for cylinder upper end
6. Oil drainage path to cylinder lower end
7. Oil drainage path through valve train to gearcase
8. Flywheel scavenger section
9. Rotary breather valve
10. Lubrication in timing gearcase
11. Crankcase exhaust tube
12. Gearcase strainer screen
13. Scavenger section of pump chain oiler
14. Oil returning to tank and rear
15. Oil tank vent line



Sportster engine lubrication system



Sportster oil pump

snap-ring pliers (or split-ring if applicable) and slip the scavenger gears free.

- 7. Remove the breather valve key.
- 8. Remove the oil pump cover and breather valve assembly.
- 9. Remove the oil pump and the idler gears.
- 10. Pry the oil pump seal free.
- 11. Punch-drive the lockpin free from the oil-pump breather valve gear. Remove the gear from the pump cover only if it is necessary.
- 12. Remove the breather valve screen.
- 13. Press the idler gear shaft free only if replacement is necessary.

Oil Pump Inspection

- 1. Clean all of the parts in a suitable solvent and blow them dry. Blow all passages free.
- 2. Replace all gaskets, the retaining ring, lockpin, and the oil seal. Homemade gaskets must be avoided since the proper thickness and proper passage holes are essential.
- 3. Replace all worn or damaged parts.
- 4. Inspect the pump body for wear or damage.
- 5. Inspect all of the gears for worn or damaged teeth and replace them as necessary.
- 6. Replace the breather valve key if it is worn or loose.
- 7. Inspect the breather valve and pump for wear and damage.
- 8. Check that the valve is a free fit.

Oil Pump Assembly

- 1. Assemble in the reverse order of disassembly.
- 2. Lightly oil all of the moving parts.
- 3. Assemble the check valve as described in "Oil Pump Check Valve Assembly."
- 4. Place the breather valve screen in

1. Oil pressure switch	12. Body cover gasket
2. Oil pump nipple	13. Pump gear
3. Check valve spring	14. Pump idler gear
4. Ball valve	15. Oil pump seal
5. Body plate	16. Oil pump body
6. Body plate gasket	17. Body gasket
7. Retaining ring	18. Drive lock pin
7A. Retainer (2) (Half ring)	19. Breather valve gear and shaft
8. Scavenger pump gear	20. Crankcase breather valve screen
9. Scavenger pump idler gear	21. Idler gear shaft
10. Breather valve key	
11. Oil pump cover	

position and secure it with a daub of grease.

5. Assemble the breather valve in the oil pump cover and secure it with a lock-pin.

6. Press a new scavenger-pump idler gear shaft into the pump body if the old one has been removed.

7. Assemble the pump gears to the pump body.

8. Secure the body gasket using a non-hardening sealer. The gasket must be carefully aligned to permit free oil passage.

9. Assemble the assembled breather valve and cover to the pump body.

10. Place a thin strip of acetate tape over the groove in the breather valve shaft. Install a new oil seal flush into the pump body counterbore with the seal's lip facing the body. Remove the tape.

11. Install the breather valve key and scavenger pump gears, and secure them with a retaining ring (or retainer, whichever is applicable).

12. Install a new body plate gasket using a non-hardening sealer. The gasket may be flattened if necessary by soaking it in water before sealing it.

13. Slide the oil pump and the body plate onto the crankcase studs, and evenly secure the studs.

14. Check for free-motion of the gears. If the gears bind, the pump may be slightly out of alignment. Remedy this by loosening the stud nuts and gently tapping the pump with a soft mallet until the correct alignment is attained.

15. Time the breather valve as follows:

a. Remove the gearcase cover as described in "Gearcase Disassembly";

b. Rotate the engine until the flywheel timing mark is aligned in the crankcase view port as described in "Ignition Timing";

c. Position the breather gear so the valve hole aligns with the pump body hole;

d. Shift the breather gear two teeth to the right;

e. Place the breather screen and pump gasket in position;

f. Install the pump carefully on the mounting studs and the breather gear will then assume the correct timing position;

g. Check to be sure that the breather

valve hole and the pump body hole are aligned. The flywheel timing mark must still be correctly aligned;

h. Assemble and secure the gearcase cover and pump.

16. Assemble the engine to the frame as described in "Engine Removal and Replacement."

GLIDE MODELS

Oil Pump Disassembly (With Engine In Frame)

1. Disconnect the oil switch, feed, and scavenger lines from the pump body.

2. Remove the cover stud nuts or bolts and their washers.

3. Slip the oil pump cover and the cover gasket from the gearcase studs.

4. Remove the driveshaft snap-ring with snap-ring pliers, and then remove the drive gear, gear key, and idler gear.

5. Remove the stud nuts which mount the oil pump body and then remove the body.

6. Remove the oil pump gear drive-shaft.

7. Remove the scavenger (1968 and later) or the feed (1967 and earlier) drive-gear, gear key, and the scavenger idler gear and key.

8. Remove the by-pass valve plug, spring, and spring sleeve.

9. Remove the check valve cover screw, spring, and ball valve.

10. Loosen the chain oiler adjusting screw locknut (if applicable) and gently seat the adjusting screw while counting the number of turns necessary to seat it. Remove the adjusting screw and washer. The screw must be replaced in the same position during assembly.

11. Remove the chain oiler screw on 1965-67 models.

12. Remove the oil pump nipples.

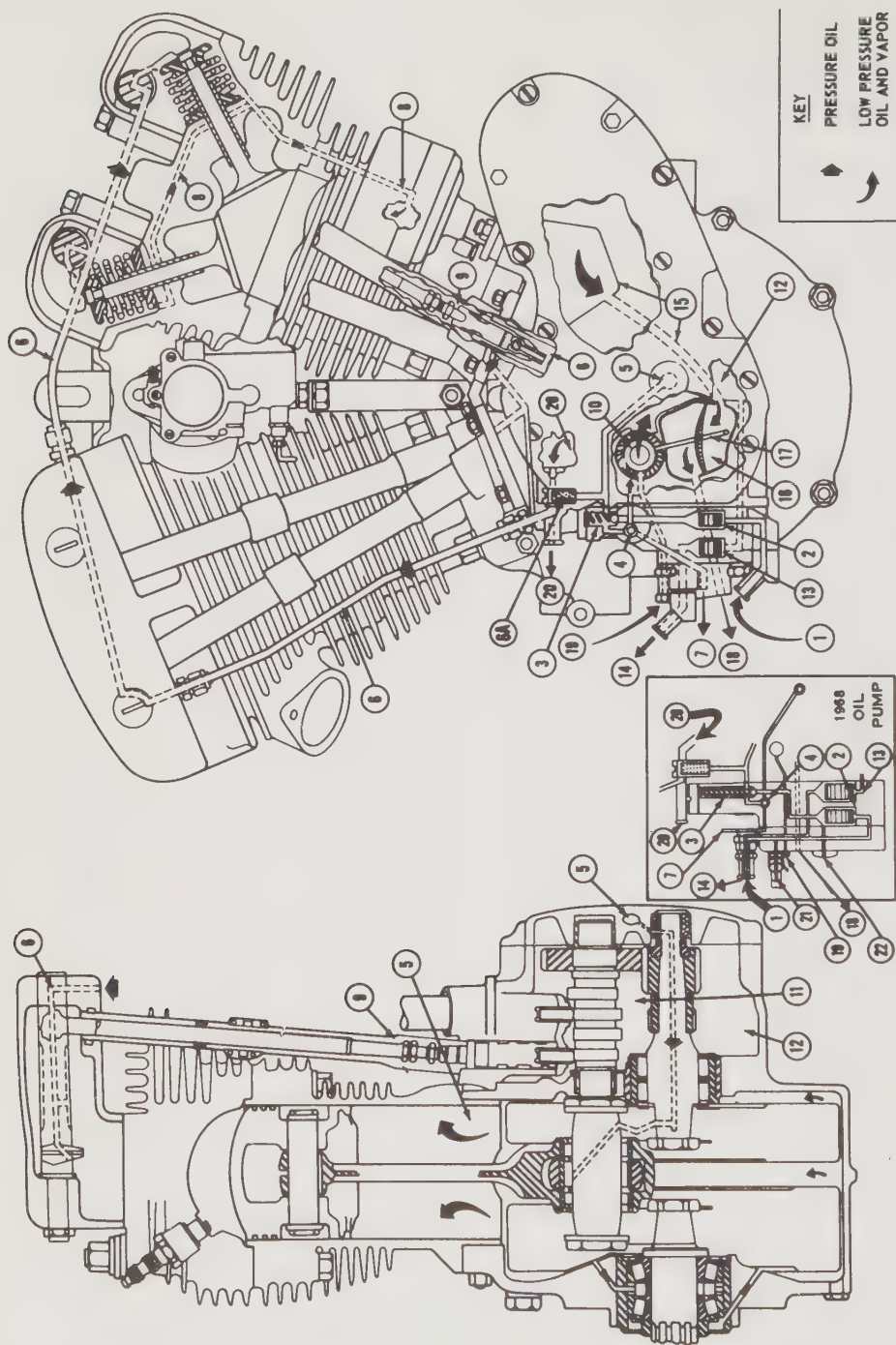
13. Do not mix any gears or keys.

Oil Pump Disassembly (With Engine Removed From Frame)

1. Remove the engine from the frame as described in "Engine Removal and Replacement."

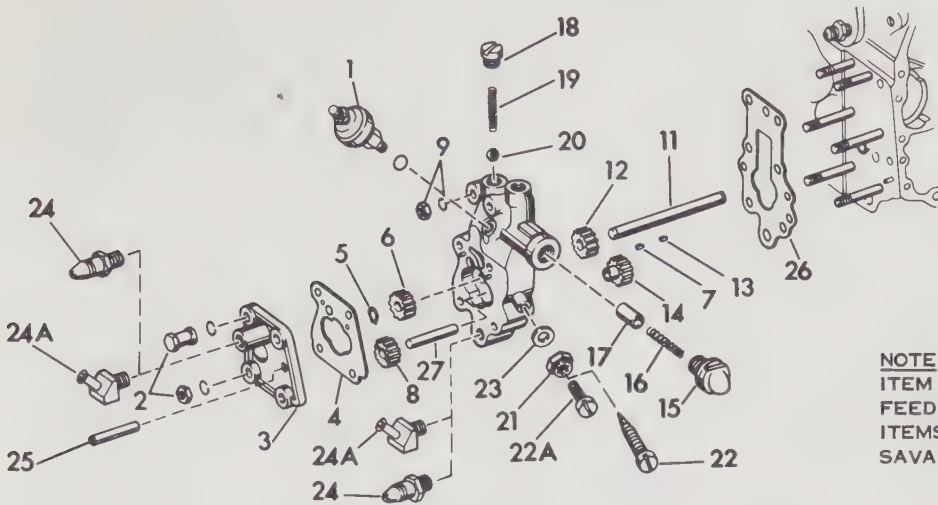
2. Remove the gearcase cover securing screws, cover, and cover gasket.

3. Remove the left-hand threaded pinion gear nut from the pinion shaft using the Gear Shaft Nut Socket Wrench (H-D



Electra Glide lubrication system

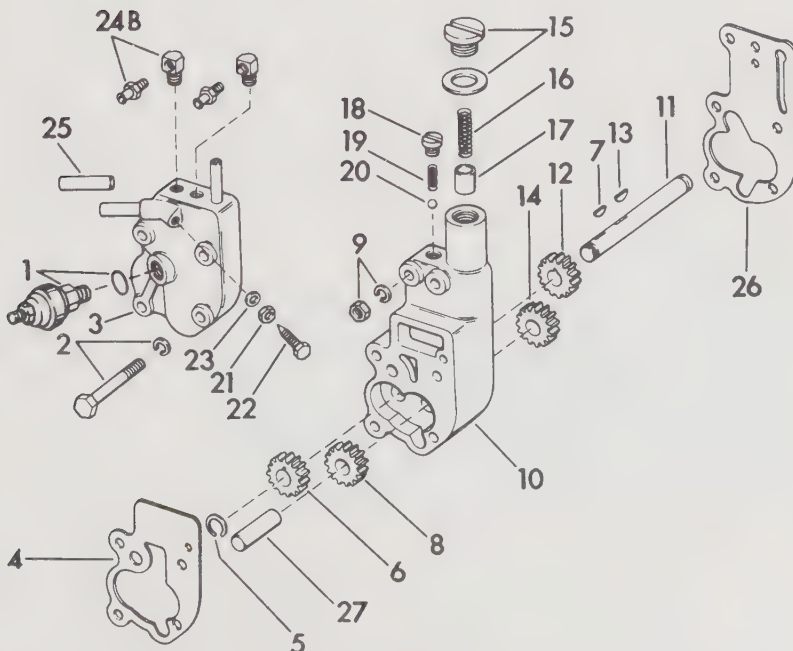
- | | | |
|--|--|---|
| 1. Gravity feed from tank to feed pump | 9. Oil drains through valve train to gearcase | 17. Transfer passage to breather valve |
| 2. Feed pump section of pump | 10. Rotary breather valve | 18. Breather tube |
| 3. Check valve | 11. Lubrication of timing gearcase | 19. Chain housing return line |
| 4. Pressure regulating valve | 12. Gearcase sump | 20. Vent line to chain housing and oil tank |
| 5. Pinion gear flow to cylinder | 13. Scavenger section of pump | 21. Rear chain oiler |
| 6. Lubrication for rockers | 14. Oil return line to tank | 22. Oil pressure switch fitting |
| 7. Oil for front chain | 15. Exhaust air baffle and transfer passage to breather oil trap | |
| 8. Oil drains from rocker housing to lubricate cylinders | 16. Breather oil trap | |



Glide model (1967 and earlier) oil pump assembly

- | | | |
|---|------------------------------------|--|
| 1. Oil pressure switch | 10. Oil pump body | 21. Chain oiler adjusting screw lock nut |
| 2. Cover stud nut or bolt and washer | 11. Oil pump gear drive shaft | 22. Chain oiler adjusting screw |
| 3. Oil pump cover | 12. Drive gear | 22A. Chain oiler screw (1965-67) |
| 4. Cover gasket | 13. Gear key | 23. Chain oiler adj. screw washer |
| 5. Lock ring | 14. Idler gear | 24A. Oil line nipple (2) (1965) |
| 6. Drive gear | 15. By-pass valve plug | 24B. Oil line nipple (2) (1968) |
| 7. Gear key | 16. By-pass valve spring | 25. Chain oiler pipe |
| 8. Idler gear | 17. Check valve spring cover | 26. Body gasket |
| 9. Oil pump body mounting stud nuts and washers (2) | 18. Check valve spring cover screw | 27. Idler gear shaft |
| | 19. Check valve spring | |
| | 20. Check valve ball | |

Figure following name of part indicates quantity necessary for one complete assembly



Glide model (1968 and later) oil pump assembly

Part No. 94555-55); vise grips may be substituted.

4. Remove the pinion gear with Pinion Gear Puller (H-D Part No. 96830-51) or a suitable, standard gear puller.

5. Remove the pinion gear key, spring, spacing collar, and the oil pump pinion shaft gear.

6. Remove the pump drive-gear shaft spring-ring, drive gear, and shaft key.

7. Remove the pump body nuts and bolts, then slip the assembled pump and pump gear driveshaft from the gearcase.

8. Disassemble the pump as described in the previous section.

Oil Pump Inspection

1. Clean all of the metal parts in a suitable solvent and blow them dry.

2. Blow all of the passages clear.

3. Inspect the valves and seats for pitting and wear, and replace the pump if its seats are damaged.

4. Inspect the keys and key seats for damage or excessive clearances—especially the pump gear shaft key if oil does not return to the tank, or the drive-shaft key if oil is not being circulated.

5. Inspect all gears for wear or damage, and replace them if necessary.

Oil Pump Assembly

1. Assemble in the reverse of disassembly.

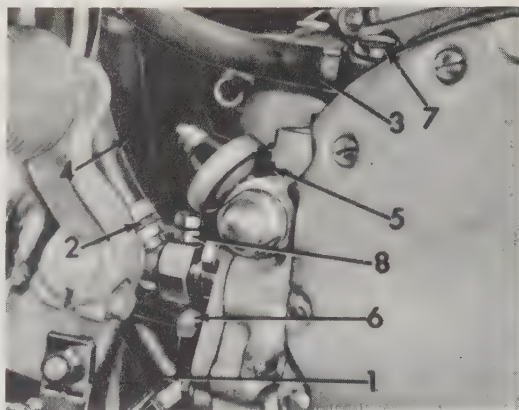
2. All the gears and keys must be replaced in their proper locations.

3. Replace gaskets and lockrings. Only factory approved gaskets should be used.

4. Secure the bolts and nuts evenly to no more than 4-5 ft lbs torque or damage to the gasket and pump will result.

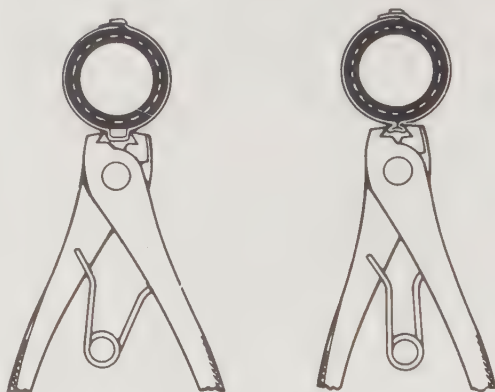
5. If leaks persist, replace the gaskets again. A small amount of non-hardening sealer may be used if great care is taken not to clog any passages.

6. Replace the oil hose clamps and squeeze them tight with Hose Clamp Tool (H-D Part No. 97087-65). Worm-



Oil lines (1965-67)

- | | |
|-----------------------------------|--|
| 1. Oil supply line from tank | 6. Front chain oiler line to chain housing |
| 2. Oil return line to tank | 7. Overhead and tappet oil screen plug |
| 3. Vent line to oil tank | 8. Rear chain oiler adjusting screw |
| 4. Vent line to chain housing | |
| 5. Return line from chain housing | |



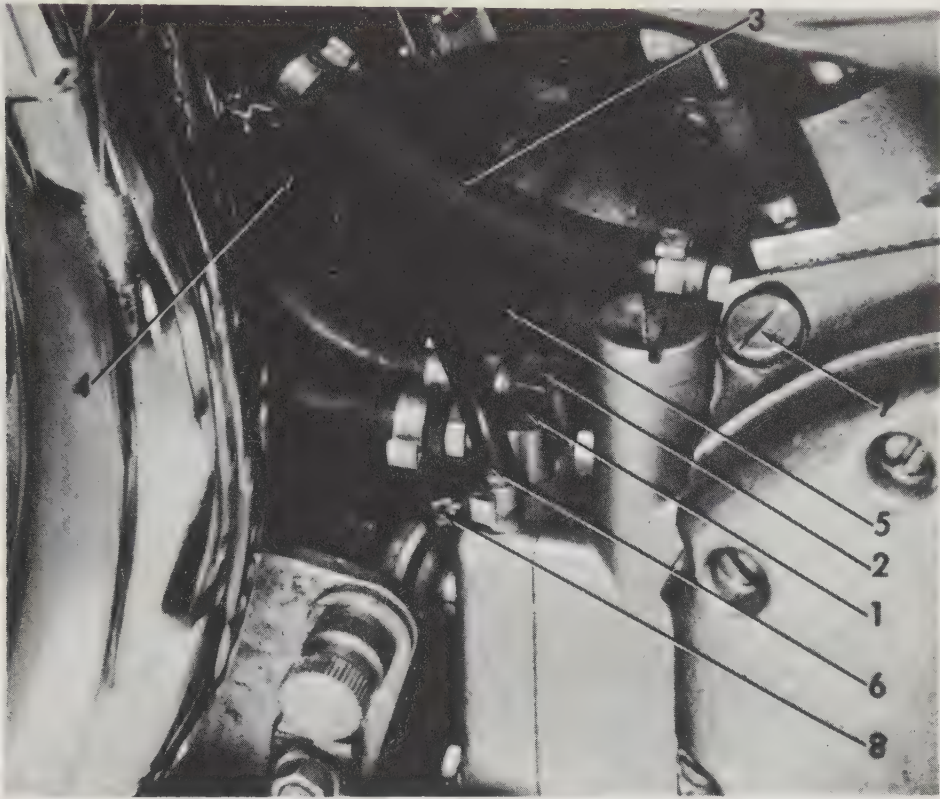
Hose clamp installation

type automotive hose clamps may be used and will require no special tools.

7. See Step 15 under Sportster "Oil Pump Assembly," for breather information.

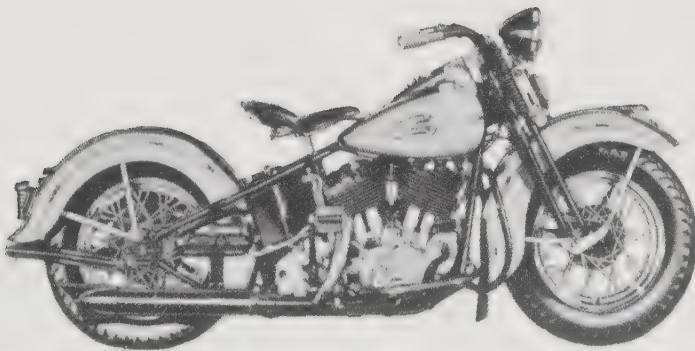
OIL PUMP MINIMUM PRESSURE

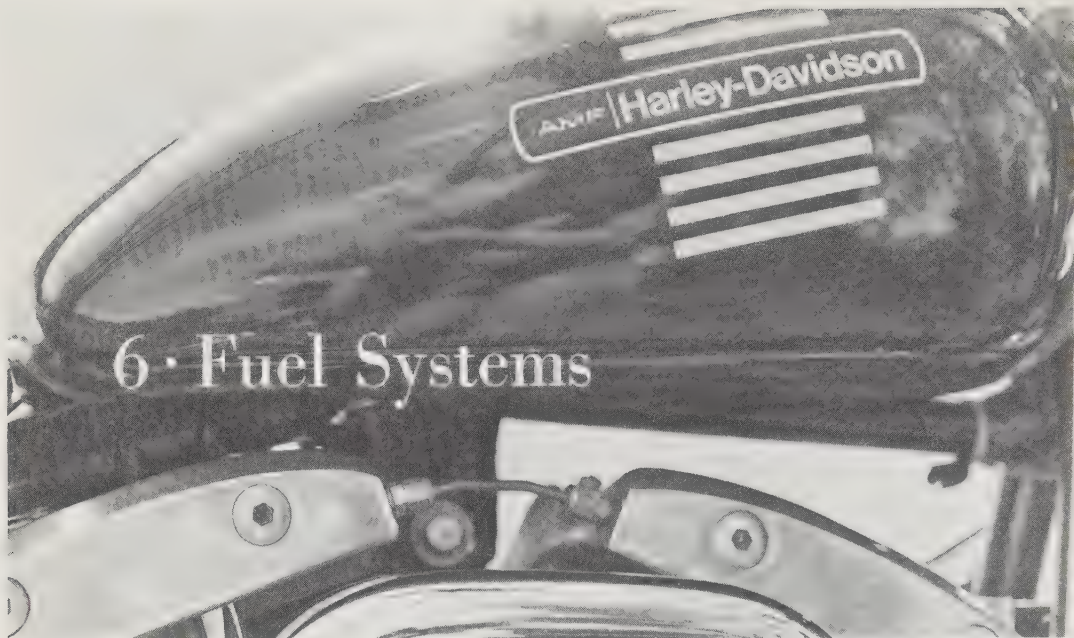
Sportster	6 psi at 20 mph
Glide models	25 psi at 20 mph
	35 psi at 30 mph



Oil lines (1968 and later)

- | | | |
|-------------------------------|--|--|
| 1. Oil supply line from tank | 5. Return line from chain housing | 7. Overhead and tappet oil screen plug |
| 2. Oil return line to tank | 6. Front chain oiler line to chain housing | 8. Rear chain oiler adjusting screw |
| 3. Vent line to oil tank | | |
| 4. Vent line to chain housing | | |





Carburetor

LINKERT MODEL DC

The Model DC is a plain, tube-type carburetor with venturi, discharge nozzle, adjustable high- and low-speed needles, and a fixed jet. The only moving parts are the throttle shaft, disc, and float assemblies.

Removal

1. Remove the air cleaner cover, element, and back plate.
2. Disconnect the fuel line at the carburetor.
3. Remove the carburetor bracket (if applicable).
4. Remove the two carburetor securing bolts and pull the carburetor out and off.

Disassembly

1. Remove the three throttle body screws, lockwashers, body gasket, idle hole body plug, low-speed needle valve, washer, and the needle valve spring from the throttle body.
2. Free the throttle disc from the shaft by removing the throttle shaft screws and lockwashers.
3. Remove the stop screw and spring from the throttle lever, then remove the throttle lever clamping screw from the

lever. Remove the spring, washer, and shaft from the throttle body.

4. Remove the carburetor bowl, by tapping it gently, after having removed the four bowl attaching screws.

5. Carefully separate the bowl gasket from the bowl.

6. Free the float by removing the float rod and unscrewing the flat speed nut.

7. Lift the float valve and seat assembly free.

8. Remove the float lever and bracket assembly by removing the float lever screw, lockwasher, and float washer.

9. Remove the support bracket (if applicable), lockwasher, and nut.

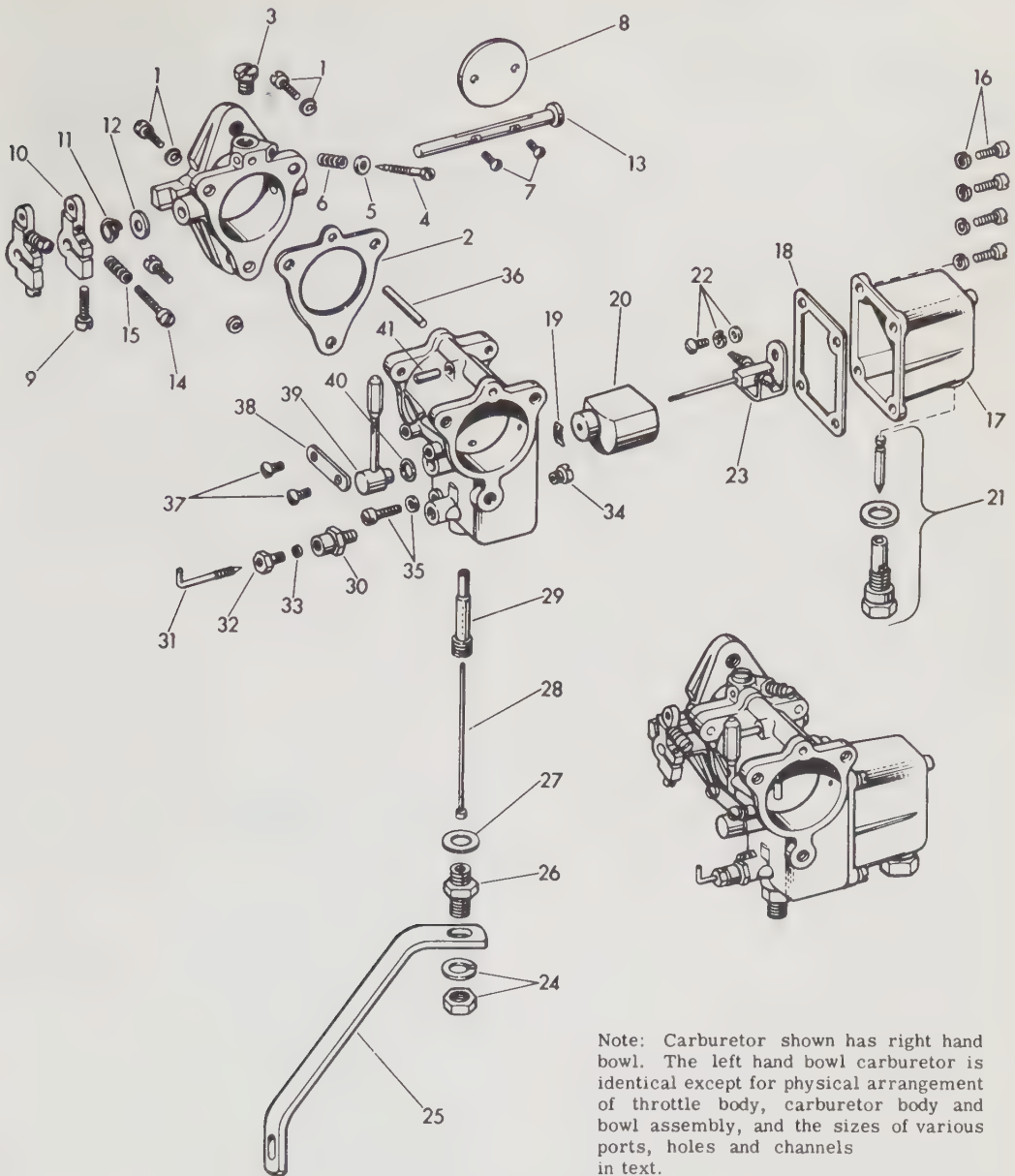
10. Removing the bowl nut and gasket reveals the idle tube which should remain in the body. Do not attempt to remove it from the bowl nut, but, if it remains in the body after the bowl nut is removed, it must be removed by tugging gently at the plug end.

11. Remove the nozzle using a screwdriver with a clean, flat head to ensure that no damage is done to the jet orifice.

12. Free the high-speed needle valve, packing nut, and packing by removing the high-speed needle valve extension housing.

13. Remove the jet which is located directly across from the high-speed needle valve hole.

14. Free the idle passage tube by removing the drain plug and gasket.



Note: Carburetor shown has right hand bowl. The left hand bowl carburetor is identical except for physical arrangement of throttle body, carburetor body and bowl assembly, and the sizes of various ports, holes and channels in text.

Model DC carburetor assembly

- | | | |
|---------------------------------------|---|---|
| 1. Throttle body screw and washer (3) | 16. Bowl mounting screw (4) | 30. High-speed needle valve extension housing |
| 2. Body gasket | 17. Bowl | 31. High-speed needle valve |
| 3. Idle hole body plug | 18. Bowl gasket | 32. High-speed needle valve packing nut |
| 4. Low-speed needle valve | 19. Float nut | 33. High-speed needle valve packing |
| 5. Low-speed needle valve washer | 20. Float | 34. Carburetor jet |
| 6. Low-speed needle valve spring | 21. Float valve and seat | 35. Drain plug and gasket |
| 7. Throttle shaft screw (2) | 22. Float lever screw and washers | 36. Idle passage tube |
| 8. Throttle disc | 23. Float lever and bracket assembly | 37. Throttle shaft screw (2) |
| 9. Throttle level clamping screw | 24. Support bracket nut and lock washer | 38. Vent clamp |
| 10. Throttle lever | 25. Support bracket | 39. Vent housing |
| 11. Throttle shaft spring | 26. Bowl nut | 40. Vent gasket |
| 12. Throttle shaft washer | 27. Bowl nut gasket | 41. Idle bleed tube |
| 13. Throttle shaft | 28. Idle tube assembly | |
| 14. Throttle lever stop screw | 29. Main nozzle | |
| 15. Throttle lever stop screw spring | | |

Figure following name of part indicates quantity necessary for one complete assembly.

15. Remove the vent housing, gasket, and idle bleed tube by removing the clamp and securing screws.

Inspection

1. Clean all of the parts, other than the gaskets and float, in a carbon and gum-dissolving solution such as Gunk Hydro-Seal® (which is recommended by the factory). Rinse thoroughly and blow them dry.

2. Clear all of the carburetor barrel passages with compressed air. Do not scrape the carbon deposits with any steel instrument.

3. Replace the throttle shaft if there is more than 0.002 in. play noticeable at the bearing.

4. Clean out the idle port holes in the throttle body with a drill bit if necessary, taking care not to increase the hole size. The proper drill bit size for models DC-1, 1L, 1M, and 10 is 0.028 in. (H-D Size No. 70); the DC-2 uses a 0.0465 in. (H-D Size No. 56) drill.

5. Open the idle jet hole with a 0.043 in. drill bit (H-D Size No. 57) and the angular hole which it meets with a 0.0635 in. drill bit (H-D Size No. 52).

6. Clear the nozzle bleed holes with a 0.055 in. drill bit (H-D Size No. 54) and the main passage with a 0.073 in. drill bit (H-D Size No. 17).

7. Clean the high-speed bit needle seat holes with a 0.052 in. drill bit (H-D Size No. 55) for models DC-1, 1L, 1M, 10, 6, 7, and 12. For model DC-2, use a 0.028 in. drill bit (H-D Size No. 70).

8. Check to see that the two vents in the carburetor body are open.

9. Be sure not to enlarge any passages and examine all of the connecting surfaces for possible leaks. Replace any leaky part or any part on which wear has caused excessive clearances.

Assembly

1. Assemble the vent housing assembly, gasket, idle bleed tube, clamp, and screw in the carburetor body.

2. Slip the tubes into their holes and tap the housing into place.

3. Secure the clamp just tight enough so that the outer ends will touch the body bosses.

4. Assemble the drain plug, gasket,

and high-speed jet on the carburetor body.

5. Back out the needle valve before installing this assembly in the main body so that the point will not enter the valve hole when the two units are secured together.

6. Position the needle valve so it doesn't jam into the seat hole and cause damage.

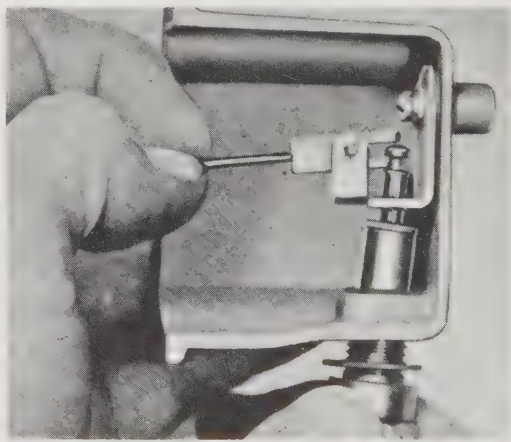
7. Assemble the nozzle.

8. Locate the idle tube in the body hole and press it in until about $\frac{1}{32}$ in. extends out from the nozzle hole.

9. Install the bowl nut and gasket; this should hold the idle tube in place.

10. Assemble the float valve and seat assembly, and install the float lever bracket screw loosely so that an adjustment can be made if necessary.

11. Holding the float valve and seat halfway into the bowl, align the lever fingers with the groove in the valve and bring them together while turning the valve into its seat. This must be done with the bowl removed from the body.

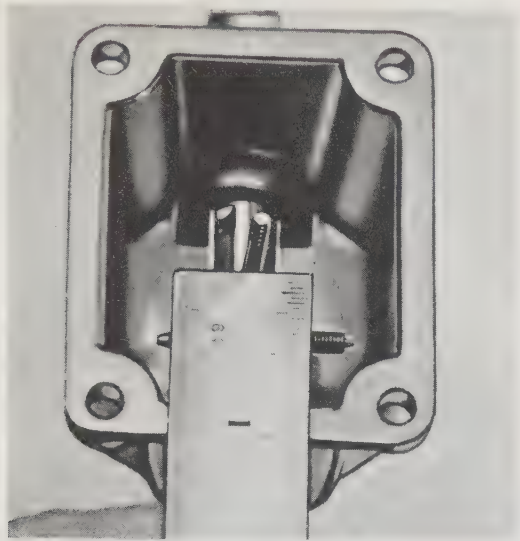


Engage float level in valve stem groove

12. Invert the bowl and measure the distance from the top of the float rod to the outer edge of the bowl flange which is directly opposite the fuel inlet fitting. at the point where the float valve seats lightly, the distance should be 1 in. $\pm \frac{1}{64}$ in.

13. Adjust the slotted float lever bracket until the proper measurement is obtained and then secure the bracket screw.

14. Place the float on the rod with the



Checking float setting

flat side up and secure it with a speed nut.

15. Mount the bowl to the carburetor main body, taking care not to crush the gasket.

16. Insert the throttle shaft so that the screw seats align with the screw holes on the throttle disc and then loosely mount the throttle disc, with the identification number facing out.

17. Rotate the disc and note whether it binds anywhere. When a position is obtained where movement is free, secure the disc and recheck its movement.

18. Install the throttle lever stop screw and spring.

19. Install the throttle lever, throttle shaft spring, and washer, and position them so that slight end-play exists when the lever is clamped tightly. Place the disc and lever in an open position and secure the throttle lever clamping screw.

20. Install the low-speed needle jet, washer, and spring, taking care not to bevel the seat with excessive pressure.

21. Secure the idle hole body plug.

22. Insert the idle passage tube into the carburetor body with the beveled end out.

23. Assemble the throttle body on the main body, using a new body gasket to ensure proper thickness. Do not use a homemade gasket because the correct thickness is critical.

24. Mount the carburetor and adjust it.

TILLOTSON MODEL HD

The model HD is a diaphragm-type carburetor and is, consequently, not susceptible to the usual problems associated with float-type models. The HD provides a uniform fuel mixture, regardless of angle or vibration, and is less prone to flooding. Its use of a secondary venturi, an automatic economizer, and an accelerating pump make it the most sophisticated carburetor offered by Harley-Davidson today.

Preliminary Inspection

(Complete all tests before replacing any parts.)

1. Without removing the carburetor, inspect the accelerating pump as follows:

a. Remove the air cleaner.

b. Prime the carburetor by gently manipulating the diaphragm with a toothpick which can be inserted through the small hole in the bottom of the plastic pump cover.

c. Twist the throttle several times, slowly and then rapidly, with the petcock in the open position. Observe the action of the pump and note whether a constant jet of fuel is delivered with each stroke. Replace the diaphragm valves and/or pump plunger if the desired result is not obtained.

2. Clean the high, intermediate, and low-speed passages in the following manner:

a. Remove the high-speed screw plug from the rear of the carburetor and gently seat the intermediate needle.

b. Apply a maximum of 90 lbs of air pressure to the high-speed channel.

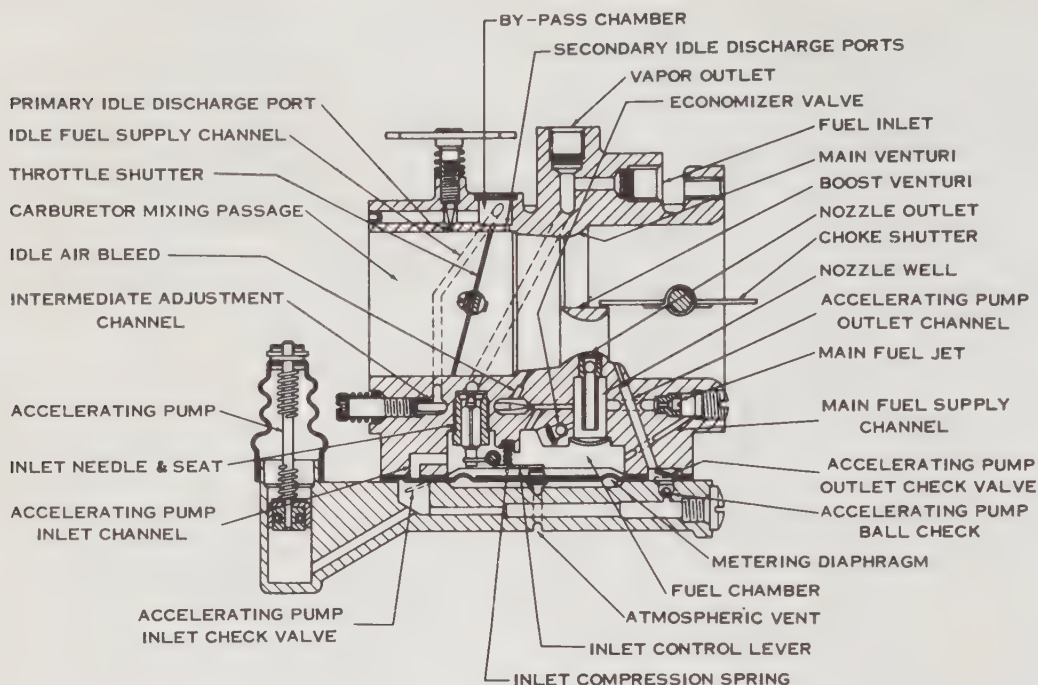
c. Open the intermediate and idle needles by three or four turns and apply air pressure again.

d. Adjust the carburetor and determine whether or not the performance has been enhanced.

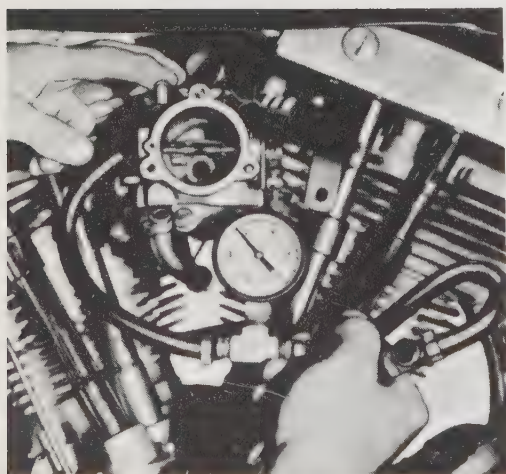
3. Test the inlet needle and seat for air leaks in the following manner:

a. Secure all plastic cover screws firmly.

b. Use Bulb Tester (H-D Part No. 94750-68) to pressure-check the needle and seat. With a tester installed in the carburetor inlet fitting and with the vent fitting plugged with a finger,



Tillotson model HD carburetor



Pressure checking inlet needle and seat for leakage

apply 1-1½ lbs of pressure. A moist needle should hold about 3-5 lbs and is a better indicator than a dry one.

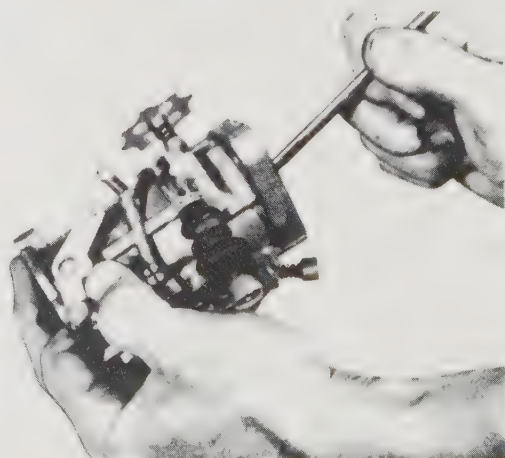
c. If a tester is not available, examine the needle tip. If excess pressure has been applied, the tip will appear slightly flattened and the seat will be beveled.

4. Remove the carburetor and inspect the intermediate adjustment needle and spring for binding which will prevent it from realizing its true seat.

a. Shorten each end of the spring with a grinder and test it for proper seating by applying blue dye to the end of the needle taper. Screw the taper lightly down into its seat and check to see if the blue has been disturbed.

5. Test the main nozzle ball check valve for leakage in the following manner:

a. Seal one end of the main jet port in the venturi with your finger and insert an appropriate size rubber tube into the opposite end of the venturi.

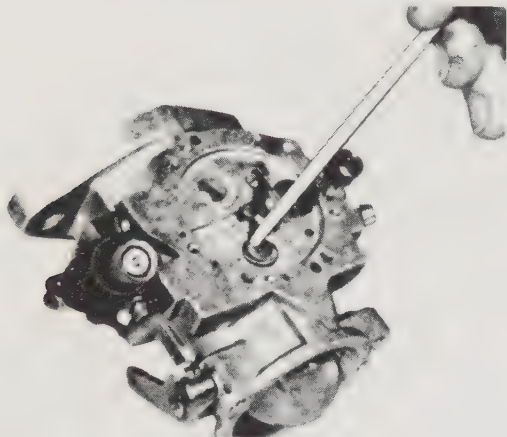


Testing main nozzle ball check valve for leakage

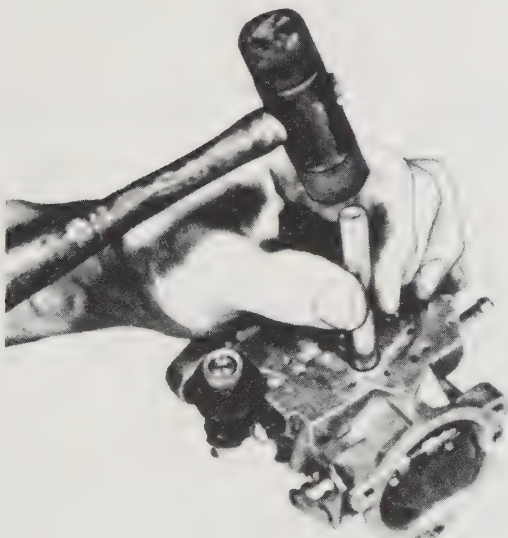
Apply alternate vacuum and pressure. Pressure should cause the ball to seat and vacuum pressure should release the ball from the nozzle assembly.

b. Replace the main nozzle check valve assembly if any leakage is present.

c. Remove the welch plug by punching it off center with an appropriate punch. Drift it into the venturi gently, using a soft mallet and an appropriate drift.



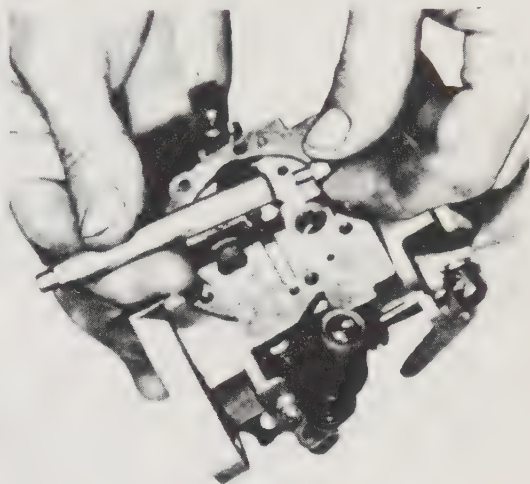
Removing welch plug



Removing main nozzle

d. Replace the new check valve using a drift. Drift (H-D Tool No. 96962-68) is available for these operations.

6. Examine the idle needle and seat for damage.



Installing main nozzle

7. Examine the choke relief disc (upper half of the choke shutter) for damage.

8. Remove the diaphragm cover and examine the accelerator pump leather and spring for wear or damage.

9. On late 1968 models, examine the accelerator-pump outlet check-valve ball for freedom of movement.

10. Inspect the gasket and diaphragm for damage and replace them if their surfaces are not uniform. The gasket should adhere to the body.

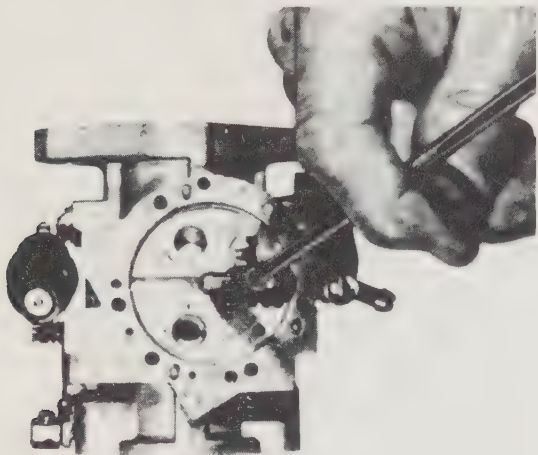
11. Check the diaphragm washer and the diaphragm for excessive movement, and replace if drag is not present.

12. Check the inlet needle linkage with a bulb tester as described in step 3b. The valve on the tester should be closed and pressure should be asserted on the inlet port. Open and close the bulb valve about ten times while applying pressure to be sure that it isn't sticking closed.

13. The inlet lever should lie flush with the floor of the carburetor and it must be replaced if it doesn't. If it is not equipped with a shackled needle, substitute with kit No. 27588-66 and torque the seat to 45 in. lbs.

14. Check the economizer ball for proper operation in the following manner:

a. Using a rubber tube of the appropriate size, seal off the economizer welch plug hole and apply mouth pressure both in and out. If the ball does not release each time it is tested, replace it.



Testing ball check valve for leakage

b. Inspect the welch plugs by attempting to move them in the body. Since they are a press-fit, they should not move. Replace any leaky or loose plug; never reuse a welch that has already been removed.

c. If the leak is due to a damaged seat, replace the plug and apply a small amount of seal-all or epoxy around the edges of the seat.

Disassembly

1. Remove the idle and intermediate fuel adjusters.

2. Remove the throttle butterfly mounting screws and the throttle butterfly. Note the position of the butterfly as an aid in reassembly.

3. The throttle shaft assembly may be slipped out of the body when the retaining screw is removed.

4. Remove the throttle shaft spring, washers, dust seals, accelerating pump assembly, diaphragm cover plug screw, metering diaphragm, and metering diaphragm gasket. Note that the gasket is mounted next to the body.

5. Remove the inlet control lever screw, inlet control lever pin, inlet control lever, and lever control tension spring.

6. Remove the inlet needle, seat, and needle gasket, taking note of proper positioning for replacement.

7. Remove the main jet plug screw, jet, and gasket.

8. Remove the main jet welch plug by drilling a shallow hole off-center with a $\frac{1}{8}$ in. drill and then prying it free with a

small punch. If you go too deep, the jet will probably be damaged.

9. Remove the remaining three welch plugs in the same manner and the economizer ball will then come free.

10. Remove the choke butterfly securing screws and the lower half of the choke butterfly.

11. Remove the choke shaft and then the upper half of the butterfly, the spring, choke friction ball, and the friction ball spring will all come free.

12. Slide the choke shaft dust seal off the shaft.

Inspection Prior to Reassembly

1. Remove all plastic parts and gaskets then clean all of the metal parts in a solvent. Hydroseal solvent is recommended.

2. Blow all passages clear with compressed air. Never use wire to poke the passages free as this causes burrs or increases the port diameters.

3. Inspect all parts for wear and replace any parts which were either found defective in tests or appeared to be excessively worn.

4. If the inlet control lever does not rotate freely on its pin or if the forked end does not firmly engage the needle, it must be replaced.

5. Replace the inlet control lever tension spring if it appears to be stretched or damaged.

6. If the inlet needle point is worn or damaged or if the contact end does not provide a snug fit, they must be replaced.

Assembly

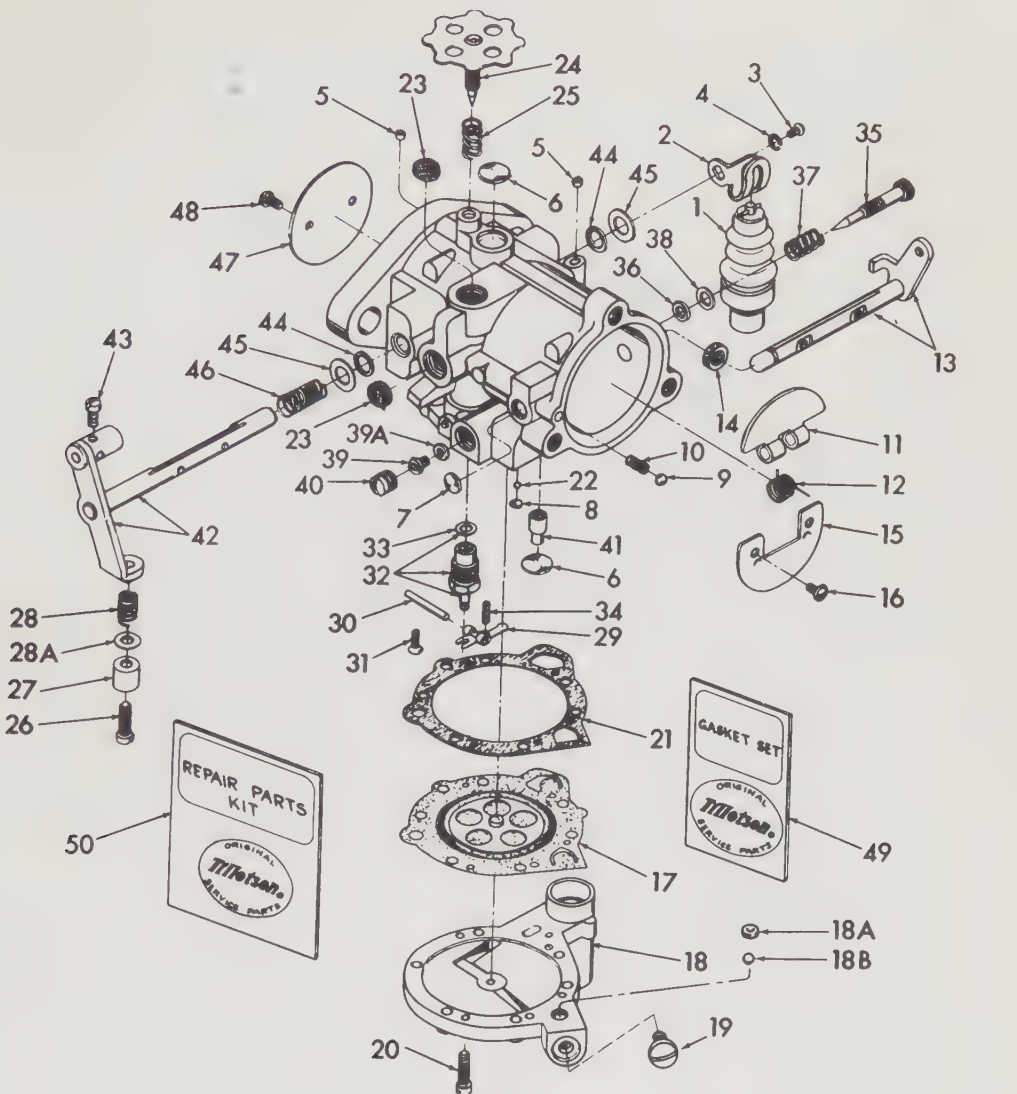
1. Examine all parts for small particles of dirt which can clog the small passages and blow them clean.

2. Assemble in reverse order of disassembly.

3. Seat the welch plugs with the recommended tool, or with a flat end drift of a diameter slightly smaller than that of the welch. A flat (rather than concave) surface is a good indication of a well-seated plug.

4. Mount the metering spring on the stud on the lever and seat it in the indentation on the body casting.

5. Torque the inlet seat assembly to 40-45 in. lbs and torque the accelerating pump channel plug to 23-28 in lbs.



Tillotson model HD carburetor assembly

- | | | |
|--|--|--|
| 1. Accelerating pump | 18B. Accelerating pump check ball | 36. Intermediate adjusting screw packing |
| 2. Accelerating pump lever | 19. Diaphragm cover plug screw | 37. Intermediate adjusting screw spring |
| 3. Accelerating pump lever screw | 20. Diaphragm cover screws (6) | 38. Intermediate adjusting screw washer |
| 4. Accelerating pump lever screw L.W. | 21. Diaphragm cover gasket | 39. Main jet |
| 5. Channel plug (2) | 22. Economizer check ball | 39A. Main jet gasket |
| 6. Welch plug | 23. Fuel filter screen (2) | 40. Main jet plug screw |
| 7. Welch plug | 24. Idle adjustment screw | 41. Main nozzle check valve |
| 8. Welch plug | 25. Idle adjustment screw spring | 42. Throttle shaft assembly |
| 9. Choke shaft friction ball | 26. Throttle stop screw | 43. Throttle lever wire block screw |
| 10. Choke shaft friction spring | 27. Throttle stop screw cup | 44. Dust seal (2) |
| 11. Choke shutter (top) | 28A. Throttle stop screw spring washer | 45. Washer (2) |
| 12. Choke shutter spring | 29. Inlet control lever | 46. Throttle shaft spring |
| 13. Choke shaft assembly | 30. Inlet control lever pin | 47. Throttle shutter |
| 14. Choke shaft dust seal | 31. Inlet control lever screw | 48. Throttle shutter screws |
| 15. Choke shutter (bottom) | 32. Inlet needle and seat | 49. Gasket overhaul set |
| 16. Choke shutter screws | 33. Inlet needle seat gasket | 50. Overhaul repair kit |
| 17. Diaphragm | 34. Inlet control lever tension spring | |
| 18. Cover | 35. Intermediate adjusting screw | |
| 18A. Accelerating pump check ball retainer | | |

BENDIX MODEL 16P12

The model 16P12 carburetor is equipped with a dual venturi, an accelerating pump a fixed main jet, an idle stop screw, a low-speed idle screw, and a ring float.

Disassembly

1. Remove the air cleaner cover, element, and the back plate.
2. Close the petcock and disconnect the fuel line.
3. Disconnect the choke and throttle cables at the carburetor.
4. Remove the accelerating pump lever screw, lever and pump assembly, and remove the piston by rotating the pump lever 90 degrees while compressing the piston shaft spring.
5. Remove the idle tube, tube gasket, main jet and tube assembly, fiber washer, rubber O-ring, float bowl, and bowl drain plug.
6. Press the float pin through the float ears.
7. Lift the float, float spring, and float valve free from the bowl.
8. Remove the bowl gasket.
9. Remove the idle needle, spring throttle stop screw, and spring.
10. Remove the choke disc securing screws and disc.
11. Slide the choke shaft and lever assembly free from the housing and remove the plunger, spring, seal retainer, and seal.
12. Remove the choke shaft cup plug only if replacement is necessary.
13. Remove the throttle disc securing screws, disc, shaft and lever assembly, and shaft spring.
14. Do not remove either throttle shaft seal retainer unless replacement is necessary.

Inspection

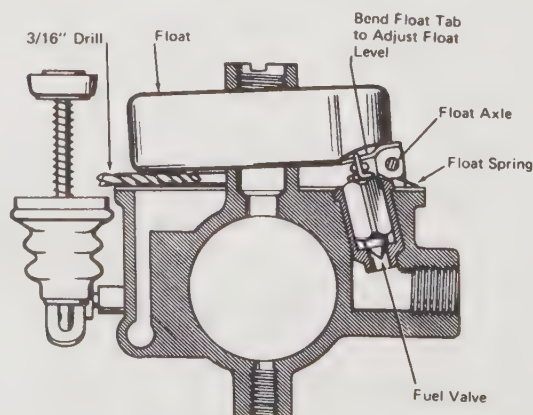
1. Clean all metal parts in a carbon and gum-dissolving solution such as Gunk Hydro-Seal® (which is recommended by the factory), rinse thoroughly, and blow them dry.
2. Blow all passages, channels, and jets clear from both directions. Do not try to clear the jets with wire or a drill.
3. Inspect all of the parts for damage,

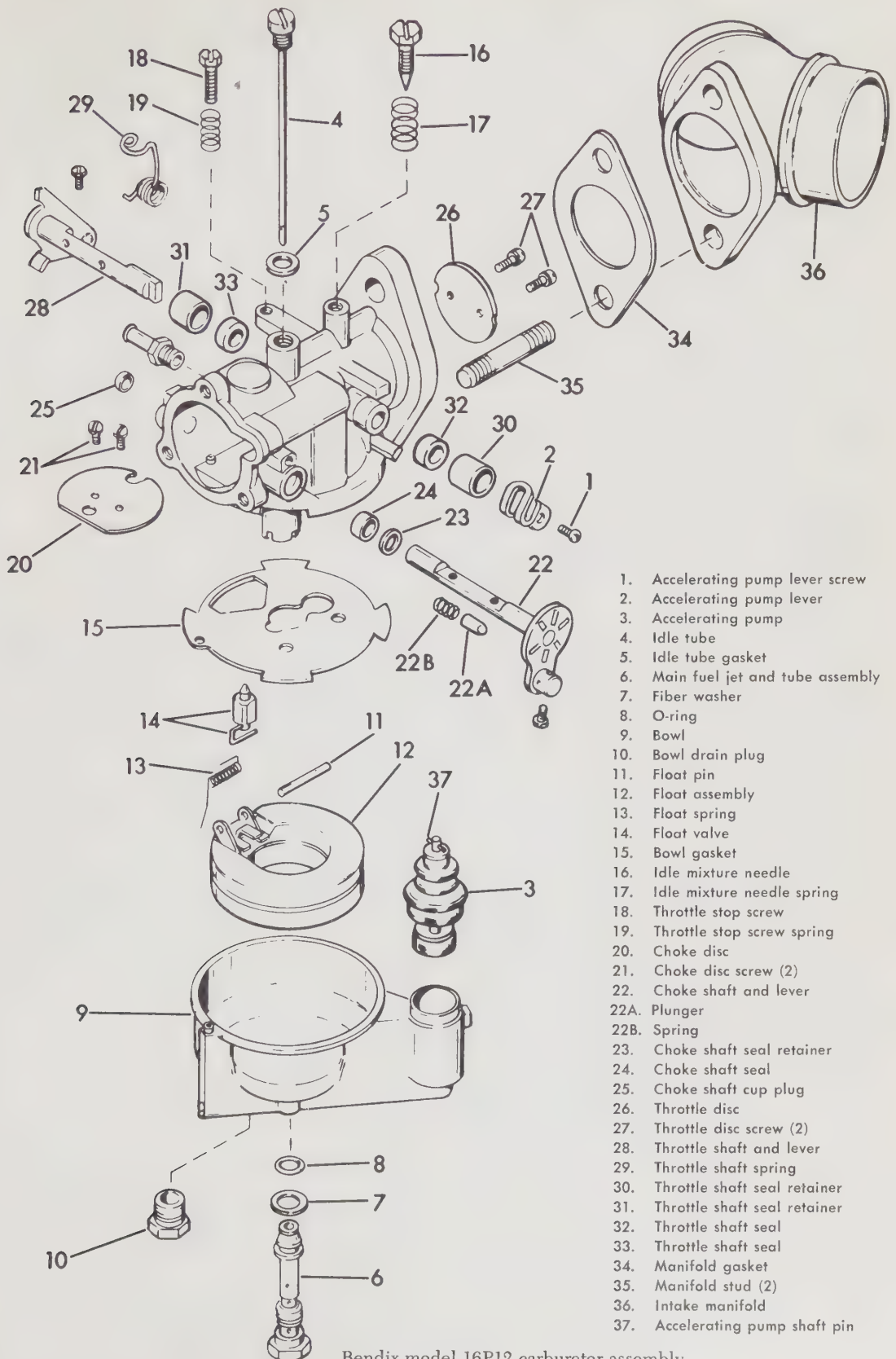
wear, or a pitted condition and replace as necessary.

4. Use all of the parts in the repair kit if such a kit is used.

Assembly

1. Assemble in reverse order of disassembly.
2. With the throttle return spring in place on the shaft, slip the shaft into the seal retainer and seal.
3. Install the shaft from the nipple side of the carburetor and secure the seal and retainer on the shaft hole boss on the opposite side of the carburetor bore.
4. Install the throttle disc on the flat side of the shaft with disc screws. Operate the shaft rapidly several times to center the disc and then secure the screws.
5. Install the choke shaft seal and retainer in the shaft hole and position the starter retainer by using a small punch.
6. Install the shaft through the housing on the opposite side of the throttle lever. Center and secure it in the same manner as was used for the throttle disc.
7. Install a new cup plug in the choke shaft hole if the original plug has been removed.
8. Install the bowl gasket.
9. Install the float valve in the bowl, hold the spring between the float ears, and then install the float pin. The valve clip must be attached to the float tab with a minimum clearance of 0.010 in. Bend the clip if it is necessary in order to attain the proper clearance.
10. With the bowl inverted, slip a $\frac{3}{16}$ in. drill bit between the bowl gasket and the float. Bend the tab with needle-nose





1. Accelerating pump lever screw
2. Accelerating pump lever
3. Accelerating pump
4. Idle tube
5. Idle tube gasket
6. Main fuel jet and tube assembly
7. Fiber washer
8. O-ring
9. Bowl
10. Bowl drain plug
11. Float pin
12. Float assembly
13. Float spring
14. Float valve
15. Bowl gasket
16. Idle mixture needle
17. Idle mixture needle spring
18. Throttle stop screw
19. Throttle stop screw spring
20. Choke disc
21. Choke disc screw (2)
22. Choke shaft and lever
- 22A. Plunger
- 22B. Spring
23. Choke shaft seal retainer
24. Choke shaft seal
25. Choke shaft cup plug
26. Throttle disc
27. Throttle disc screw (2)
28. Throttle shaft and lever
29. Throttle shaft spring
30. Throttle shaft seal retainer
31. Throttle shaft seal retainer
32. Throttle shaft seal
33. Throttle shaft seal
34. Manifold gasket
35. Manifold stud (2)
36. Intake manifold
37. Accelerating pump shaft pin

Bendix model 16P12 carburetor assembly

pliers until the bit is in contact with both the gasket and the float.

11. Install the throttle stop screw and spring, and turn it in slightly. The no. 2 idle discharge hole must not be uncovered by the throttle disc.

12. Assemble the spring on the idle mixture needle and gently screw it in until it seats, then back it out $1\frac{1}{2}$ turns.

13. Gently place the accelerating pump cup into the pump well and seat the pump boot around the top of the pump boss.

14. Assemble the fiber washer and rubber O-ring on the main jet. The O-ring must seat in the groove near the end of the tube.

15. Check to make sure that the accelerating jet fits properly in the throttle body.

16. With the carburetor inverted and the long end of the spring against the float, install the float bowl. The long end of the spring should seat against the side of the bowl.

17. Loosely install the main jet and secure the drain plug in the bottom of the bowl.

18. Install the idle tube gasket and the tube end in the discharge tube. Secure the idle tube and the main jet.

19. Assemble the accelerating pump lever to the pump and throttle shaft.

Some of the rust can be removed by removing the tank and inserting some small ball bearings. Shaking the tank will cause the bearings to knock rust loose and the tank can be flushed clean with gasoline or kerosine and blown dry. Do not use large bearings as they may dent the walls. Before using, make sure that the screen in the petcock is clean.

Tanks may be arc-welded, gas-welded, or soldered to repair leaks. All traces of gasoline and fumes must be removed before this is done because, otherwise, the tank will explode. Any work of this sort should be done by your dealer, unless you are an experienced welder. Epoxy may be used on small cracks in areas which are not under great pressure, but this is more a temporary measure than a remedy.

Petcock

The diaphragm-type petcock is located under the tank and has two handles. One is marked "reserve" and the other, which has no markings, is for the main supply of fuel. Both are in operation when in the vertical position and are off when in the horizontal position. The reserve supply should never be used unless it is absolutely necessary, because, otherwise, no indication of fuel supply is available.

The internal tank-type petcock is operated by a plunger which is located just ahead of the left tank filler cap. The main supply is in use when the plunger is unscrewed, but not lifted. Both supplies are cut off when the plunger is finger-tightened on its seat.

Both types of petcock should always be turned off when the engine is not running.

When the left tank has been repaired, the petcock fittings must be aligned with the Gas Shut-Off Valve Tool (H-D Part No. 96365-42) in the following manner:

1. Remove the tank and all of the petcock fittings.

2. Shift the spacing handle until the aligning bar is through the hole which has been left by the petcock.

Fuel Tank

Whenever the motorcycle is to be stored for an extended period of time, the tank should be drained and the inside should be bathed with a gas/oil mixture. This will leave an oil film on the walls of the tank after the fuel evaporates. This and the use of high octane gasolines with moisture-absorbing additives are the best rust preventive measures. Before subsequent use, the tank should be flushed out with gasoline or kerosine.

If the tank becomes rusted within, measures must be taken to prevent rust particles from entering the carburetor. Either a series of screens in the petcock or a fuel strainer should be employed.

3. Apply pressure to the bar until it lines up with the top hole which has been left by the plunger.

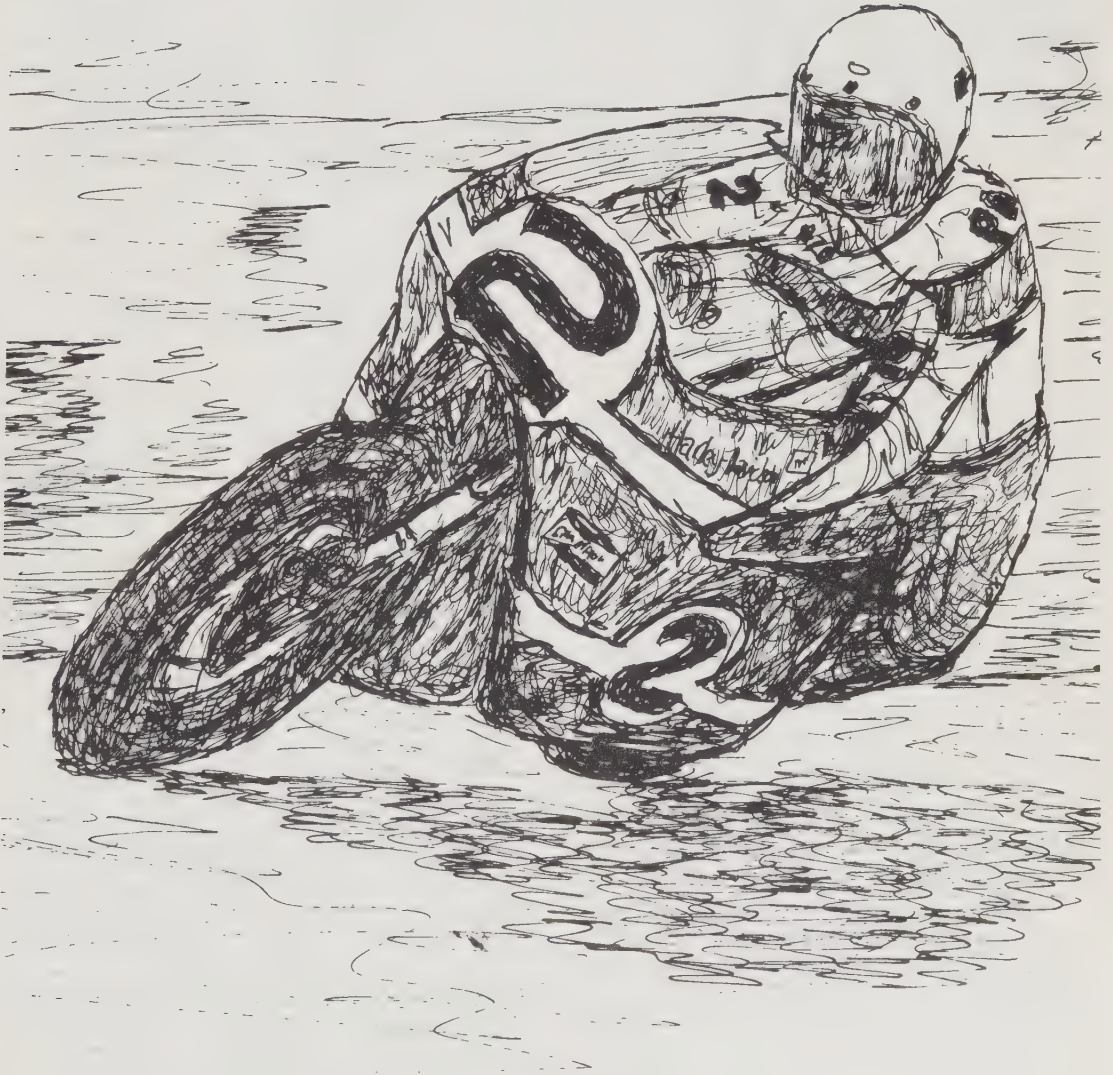
4. Insert the T-handle from the top and screw it in halfway.

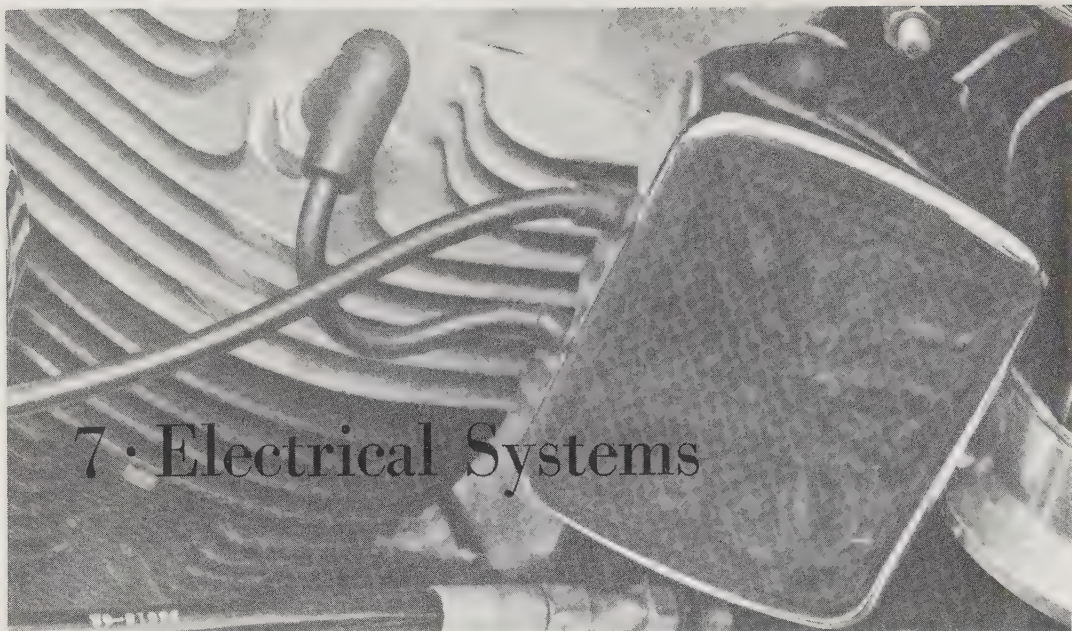
5. Back out the bar until the spacing handle reads "spacing."

6. Tighten the bar and handle, and strike them with a hammer until they are perpendicular to the tank fitting.

7. Reassemble the tank fittings.

NOTE: Before installing the fuel petcock, the threads should be coated with a suitable sealer.





7 • Electrical Systems

Charging System

GENERATOR-EQUIPPED MODELS

On DC generator-equipped models, the standard generator used is a two-pole, two-brush unit of conventional construction. Two types of regulator have been used throughout the years, the two-relay type voltage regulator and the three-relay type voltage/current regulator. The generating system is quite similar to automobile generating systems, and presents no major testing or service difficulties.

Troubleshooting the Generating System

The following is the most direct approach to take in locating the source of generating system difficulties:

1. The following items are indicators of a faulty generating system:

a. Failure of the generator light to operate.

b. Repeated or sudden battery discharging.

c. Excessive battery water evaporation indicating an overcharged state.

2. In testing the generating system, do not commit the following mistakes which will result in damage to the system:

a. Do not reverse the generator polarity.

b. Do not short or ground any wires unless specifically instructed to do so.

c. Do not operate the engine while the generator output terminal is disconnected.

d. Always connect positive to positive and negative to negative when connecting a charger or booster to the battery.

3. Check for a faulty generator light in the following manner:

a. If the ignition switch is turned off and the light is on, disconnect the generator 1 and 2 leads at their terminals. If the light stays on, check for a short between these two leads. Replace the rectifier bridge if the light goes out. Failure to remedy this situation will result in a discharged battery.

b. If the generator light doesn't go on when the ignition switch is turned on, check for a short between leads 1 and 2. If the light still doesn't come on, reverse the two leads. If the light still hasn't come on, check for an open circuit in the following manner:

(A) Connect the two leads of a voltmeter to ground and the No. 2 generator terminal, and check for a reading. Go on to the next step if a reading is obtained. No reading indicates an open circuit between No. 2 terminal and the battery. Correct this, then see if the light goes on when the ignition is turned on.

(B) Either connect or disconnect

both No. 1 and 2 generator leads, turn the ignition switch on, and momentarily ground No. 1 terminal lead only. If the light does not come on, check for a burned out bulb, blown fuse, faulty bulb socket, or an open condition between No. 1 terminal and the ignition switch. Remove the ground from No. 1 terminal if the light comes on, and with No. 1 and 2 terminals connected, ground generator by inserting a screwdriver into the generator test hole.

(C) If the light still hasn't come on, check for open circuits between the wiring harness and the No. 1 terminal, generator brushes, slip rings, and field windings.

(D) If the light came on in the first step and there was a voltmeter reading, replace the regulator.

(E) Consult the next section if the light stays on when the motor is running.

4. Locate the reason for an undercharged battery in the following manner:

a. Make sure the reason the battery keeps going down is not because the accessories have been left on without the engine running.

b. Check the drive belt for proper tension.

c. Check the battery for shorting with a voltmeter or hydrometer indicated by one or more dead cells.

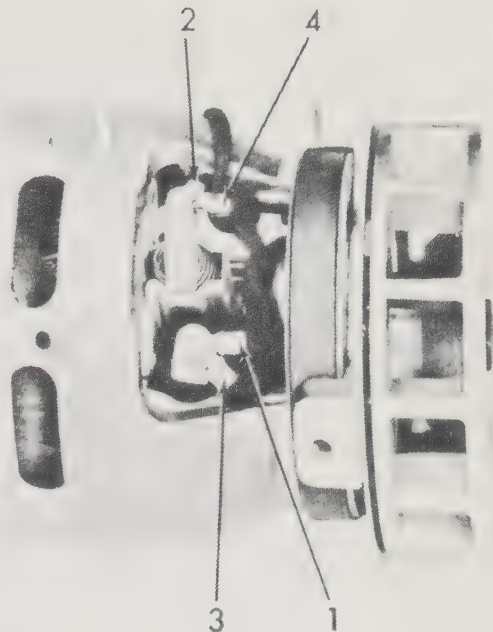
d. Inspect all wiring for loose or poor connections.

e. Connect the leads of a voltmeter from ground to the generator "BAT" terminal, then the No. 1 terminal, then the No. 2 terminal. No reading indicates an open condition between the battery and the voltmeter connection.

5. Check the generator in the following manner if the problem hasn't yet been discovered:

a. Disconnect the battery ground wire, connect an ammeter so the current will pass through it from the generator "BAT" terminal to the lead which was connected to the "BAT" terminal, and reconnect the battery ground wire.

b. Turn on all of the accessories and attach a carbon pile across the battery terminals. Operate the engine until maximum current output is obtained.



Fan-cooled generator wiring (4 leads)

c. If generator is good, amperage output will be within 10 percent of output stamped on generator frame. Go back and recheck the previous steps.

d. Ground the generator by inserting a screwdriver through the generator test hole if amperage isn't within 10 percent of its normal rating.

e. Recheck with a carbon pile as described above. If the reading is still not within 10 percent, the regulator must be replaced.

f. Recheck with a carbon pile and overhaul the generator if the reading still isn't within 10 percent of its rated amperage.

6. Locate the reason for an overcharged battery in the following manner:

a. Check the state of battery charge with a voltmeter or hydrometer.

b. Connect the leads of a voltmeter to ground and generator No. 2 terminal to check for an open reading (zero). The voltage, in any case, should not exceed 16.0 volts at 0° F. Discrepancies in measurements taken in cold and hot conditions are to be expected.

7. If the above test proves that the circuit is good and excessive water evaporation still indicates an overcharged battery, separate the generator end frames and check the field windings for a

shorted condition in the following manner:

a. Connect the leads of an ohmmeter from the brush lead clip to the end frame and then reverse the connections. The ohmmeter must be set on its lowest range scale.

b. If both readings are zero, check for a grounded brush lead. This is probably caused by a missing or damaged insulating washer or insulating screw sleeve.

c. If, after replacing the insulating elements, both readings are still zero, the regulator is defective and must be replaced.

Testing Generator Output

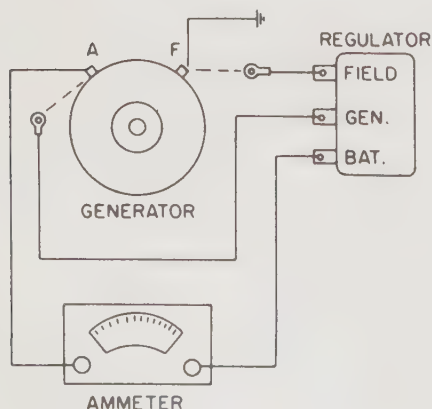
1. Remove the wire from the generator "F" terminal and connect a jumper wire from the "F" terminal to ground.

2. Remove wire(s) from "A" terminal and connect the positive lead to a 0-30 amp ammeter.

3. Run the engine at 2,000 rpm (40 mph in Fourth gear) and briefly connect the negative lead of the ammeter to the positive battery terminal.

NOTE: Avoid running the engine for long periods with the generator field grounded, and always disconnect the ammeter lead from the battery before stopping the engine so the battery doesn't discharge through the generator.

CAUTION: Disconnect the wires from the regulator before grounding the regulator "F" (XLH) or "BT" (XLCH) terminals to check output, or regulator will be damaged.



Wiring diagram for generator output test

4. If the ammeter reads 10 amps, the generator is good and the trouble is in the voltage regulator or wiring circuit.

5. When installing generators or batteries and whenever the generator or regulator wires have been disconnected, flash the field coils to make sure the generator has correct polarity. Do this by briefly touching a jumper wire between "BAT" and "GEN" terminals on the regulator before starting the engine and after connecting all of the wires. The momentary surge of current from the battery to the generator will correctly polarize the generator.

NOTE: If generator output findings are negative, consult the following section before removing the generator for further testing.

Cleaning and Inspecting Generator Brushes

1. Remove the commutator end cover nuts, washers, and frame screws.

2. Pry or gently tap off the commutator end cover from the frame and armature shaft.

3. Remove the brush holder mounting plate from the frame and disconnect the brush wires and generator positive brush cable from the brush holder terminals.

4. Remove the brushes and clean the holders with a suitable solvent. Replace the brushes when they are broken, gummy, or worn to the point where the longest side of the brush measures $\frac{1}{2}$ in. or less.

5. Seat new brushes with a brush seating stone.

Generator Removal and Installation

1. Disconnect the "BAT" wires from the voltage regulator terminal and disconnect the wires from the generator.

2. Take out the two long generator mounting screws and remove the generator from the left-side of the bike.

3. Install the generator in the reverse order of removal.

Generator Disassembly and Component Testing

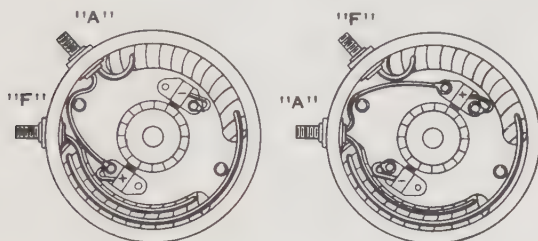
TESTING FIELD COILS

An ammeter will react to an overload by sending its needle beyond the range of the calibrated scale. A direct short

causes the needle to swing violently to the end of its travel. In both cases, damage will result to the ammeter if contact is not instantly broken. In testing field coils, first make sure there is no short present by making brief contact before securing the test lead. Try to work on a non-conductive surface and never touch the test points together.

The test is made by linking together an ammeter and a battery in series, with the components to be tested connected to leads.

1. Remove or insulate the brushes from armature.



1965 MODEL 65-12V.

1966 MODEL 65A-12V.

Internal connections of brushes to field terminals

2. Touch one test lead to "F" terminal and ground the other to the generator frame. There should be no reading.

3. Touch one test lead to "A" terminal and ground the other. If there is a reading for either, there is a grounded terminal or else the field coil is grounded to the frame.

4. Check terminal-to-ground contact. No reading means that the terminals are properly insulated. If there was a reading in Steps 2 or 3, but there is not now, the trouble is probably a grounded field coil.

5. Remove the generator drive gear using a gear puller. (H-D puller is Part No. 95715-19A.)

6. Press the armature out of the ball bearings with an arbor press. This can be done cheaply at any machine shop or by placing the generator frame between the copper jaws of a vice and tapping the gearshaft end with a soft mallet.

7. Disassemble the terminals and remove the field coil leads. Examine all of the terminal components for wear and damage, especially all of the insulators. Replace any that are worn. Assemble all components except the field coil leads.

8. Touch one test lead to the field coil lead and the other to the ground on the generator frame. Check the other coil lead. A reading means that the coil is grounded and that the two coils must be separated by cutting the wire which connects them.

9. Test each field coil as above. A reading means that there is a grounded coil which must be replaced.

10. Test the field coils by touching the test leads to the coil lead terminals. The 6 volt double coils should produce a reading of 0.2 amps; 12 volt double coils should produce a reading of 2.3 amps (1965 models). No reading means an open coil. A higher reading means a shorted coil.

11. Strip back the insulation and scrape the wire clean where the two coil leads are joined. Attach one test lead at this point and the other at either coil lead. The 12 volt coils should produce 4.6 amp (1965 models) readings. Test the other coil lead. No reading means an open coil. A higher reading means a shorted coil. Replace any faulty parts.

12. Touch one test lead to the brush holder mounting plate and the other to the positive (insulated) brush holder. A reading indicates a shorted holder. Clean, check, and replace the plate if necessary.

13. Check the negative brush holder to see that it is securely mounted and well grounded.

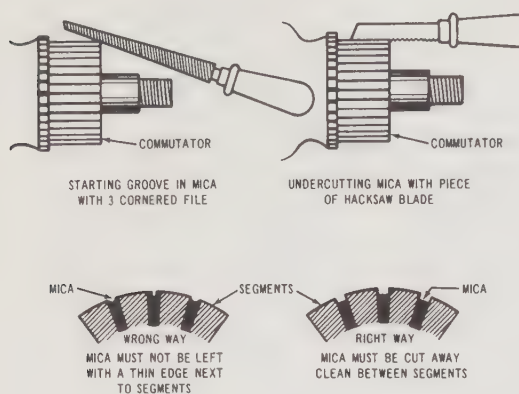
14. If the problem has not been located, it is probably the armature.

TESTING THE ARMATURE

Check for electrical continuity between the armature core and the commutator. If continuity exists, the armature is defective and should be replaced.

REPAIRING COMMUTATOR

The commutator can be turned down on a lathe or sanded with fine "00" sandpaper. Never use emery paper since particles will embed, causing arcing. The mica insulation must be 0.025 in. below the surface of the sections and can be reduced to this point with a hacksaw blade if care is taken to keep the slot bottoms square.



DISASSEMBLY

1. Remove the gasket, gear shaft nut, and washer.
2. Remove the drive gear with a gear puller (H-D Part No. 95715-19A) and slip the drive end oil deflector off the shaft.
3. Remove the brush cover strap and the end nuts and washers, then pull the screws out of the frame.
4. Loosen and remove the end cover with a soft mallet.
5. Remove the brush holder mounting plate and securing apparatus.
6. Press the armature out of the bearing with an arbor press, which can be found in any machine shop, or by clamping the generator in a copper-jawed vise and striking the shaft end with a soft mallet.
7. Remove the terminal screws, nuts, washers, insulator, and positive brush cable.
8. Remove the end plate by tapping gently and remove the bearing retainer with needlenose pliers.
9. Press the armature bearing out of drive end plate and remove the bearing retainer.
10. Press the armature oil seal out of the drive end plate from drive-gear side.
11. Remove the two pole screws with a large screwdriver and remove the pole shoes and field coils (only if replacement is necessary).

INSPECTION

1. Clean all parts except the armature, coils, and brushes in cleaning solvent, and wipe all other components with a cloth soaked in solvent.
2. Inspect all part for excessive wear, especially the insulators, armature wind-

ings, coil wrappings, and pole shoe surfaces.

3. Replace the oil seal if the armature looks oily.

4. Replace any part of the brush holder mounting assembly which is bent. Disassemble the parts in the order shown in "Generator Assembly" illustration.

5. Check for excessive play of the armature shaft in the end cover bushing or roller bearing.

6. Bushings can be removed best with a bushing puller (H-D Part No. 97250-58) and an arbor. Be sure that the new bushing seats firmly in the bearing recess in the generator drive end plate.

7. To remove an arbor from the generator case, insert a screwdriver to assist in twisting it out.

8. Roller bearings are removed by pressing and new bearings should be pressed in until the bearing end is flush with the end cover.

9. Replace ball bearings if play is present. Always pack the bearings with a suitable grease.

ASSEMBLY

1 Assemble all related parts to the brush holder mounting plate.

2. Place the pole shoes in the field coils and insert into the frame. Tighten the pole shoe screws with a large screwdriver and vise grips until the shoes align themselves in the frame.

3. Place the bearing retainer in the inner groove of the drive end plate and press the bearing in until it finds its seat on the retainer. Compress the bearing retainer with needlenose pliers and secure it in the outer groove.

4. Press the oil seal into the drive end plate.

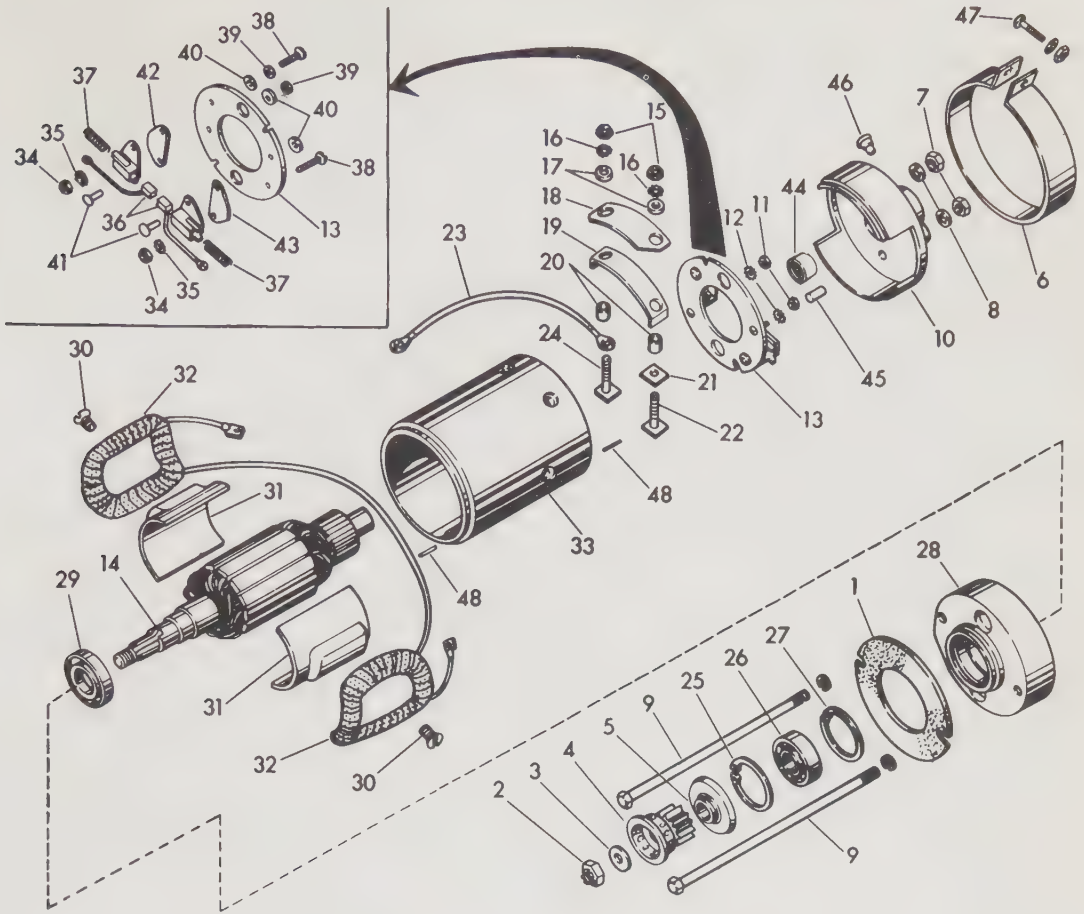
5. Insert the armature drive end shaft and press it in until it is properly seated.

6. Assemble the "A" terminal coil lead, positive brush cable, terminal screw bushing, bolt clip and terminal insulator on the positive terminal screw.

7. Insert the assembled "A" terminal through the terminal frame hole from inside and secure it with the insulating washer, lockwasher, and terminal screw nut.

8. Assemble the "F" terminal and secure it from the inside out.

9. Slip the frame over the armature,



Generator assembly

- | | | |
|------------------------------------|----------------------------------|--|
| 1. Mounting gasket | 18. Terminal insulator | 35. Terminal screw lockwasher (2) |
| 2. Gear shaft nut | 19. Terminal bolt clip | 36. Brush (2) |
| 3. Gear shaft washer | 20. Terminal screw bushing (2) | 37. Brush spring (2) |
| 4. Drive gear | 21. Bracket insulator | 38. Brush holder plate screw (2) |
| 5. Drive end oil deflector | 22. Terminal screw (2) | 39. Brush holder plate screw washer (2) |
| 6. Brush cover strap | 23. Positive brush cable | 40. Brush holder plate screw washer (3) |
| 7. Commutator end cover nut (2) | 24. Terminal screw (see item 22) | 41. Brush holder plate rivet (2) |
| 8. Commutator end cover washer (2) | 25. Bearing retainer | 42. Brush holder insulation |
| 9. Frame screw (2) | 26. Armature bearing | 43. Brush holder spacer |
| 10. Commutator end cover | 27. Bearing retainer | 44. End cover bearing |
| 11. Brush cable nut (2) | 28. Drive end plate | 45. Generator oil wick |
| 12. Brush cable washer (2) | 29. Armature oil seal | 46. Commutator end cover oil cup |
| 13. Brush holder mounting plate | 30. Pole shoe screw | 47. Brush cover screw, lock washer and nut |
| 14. Armature | 31. Pole shoe (2) | 48. End locating pin (2) |
| 15. Terminal screw nut (2) | 32. Field coil (2) | |
| 16. Terminal screw lockwasher (2) | 33. Frame | |
| 17. Insulating washer (2) | 34. Terminal screw nut (2) | |

taking care to locate the pin in its hole in the drive end plate.

10. Draw the loose end of the positive brush cable out from the commutator end of the frame.

11. Push the brushes back in their holders to clear the commutator and install the assembled brush mounting plate

over the commutator so that the pin lines up with the slot and the brush cable passes through the opposite slot.

12. Secure the positive brush cable and lead to the insulated terminal. Secure the negative brush to the grounded terminal.

13. Place the commutator end cover

over the end of the shaft so that the frame pin and notch are aligned.

14. Install the internal lockwashers on the frame screws by feeding them through the generator drive end and secure them from the outside.

15. Check to see if the armature is stuck or if the core strikes the pole shoes, by rotating the shaft. The shaft should turn evenly when pressure is applied. If the core strikes the pole shoes, either the shoes or the generator ends are not properly situated.

16. Assemble the drive end oil deflector, drive gear, and washer on the shaft and tighten them until the gear seats against the oil deflector.

17. Install the brush cover strap and install a new mounting gasket, using a suitable sealer.

Fan Cooled Generator

The fan-cooled generator is basically the same as the standard unit, but is physically larger—capable of generating higher current—and is equipped with a heat-dissipating fan.

Tests concerning this type of generator are the same except that its output is 20 or more amps and the field coils have four leads instead of two. Also, when testing the field coils, the ammeter should read for each coil.

DISASSEMBLY

1. Remove the fan housing and associated hardware.

2. Remove the armature shaft nut and washers. Use a gear puller (H-D Part No. 95635-46) to separate the fan from the shaft and remove the key (if applicable).

3. Remove the baffle screws, plate, fan spacer, housing spider, and end plate. Use a gear puller to remove the brush and bearing housing. The bearing should come off with the housing, but leave it there if it doesn't.

4. Remove the terminal screws and the brush and spring assemblies will come out of their holders.

5. If the field coils are to be tested, they are now accessible and no further disassembly is necessary.

6. Drive the clutch spring collar pin out of the collar (Duo-Glide).

7. Remove the clutch spring and drive gear from the armature shaft and

use a gear puller to separate the clutch from the shaft. Slip the oil deflector from the shaft.

8. Remove the end frame with a bearing, gasket, oil retainer, and bearing shims (if applicable). This can be done best by loosening the frame screws about $\frac{1}{4}$ in. and tapping on them to unseat the frame end. Note the number and position of shims.

9. Remove the armature from the frame with an arbor press or soft mallet.

10. Remove the drive end ball bearing, spring ring, and felt grease retainer.

11. Remove the brush holders only if tests prove that the positive terminal is shorted, or if they are damaged. This can be done after the negative brush holder screws and terminal screw nuts are removed.

12. If the pole shoes or field coils are to be replaced, they can be removed by loosening the retaining screws and tapping their heads.

13. Remove the air intake shields.

INSPECTION

Refer to the preceding "Inspection" section for the standard generator. Procedures are the same.

ASSEMBLY

Assemble the generator in reverse order of disassembly. Note the following points:

1. Install the field coils, armature, felt retainer, spring ring, and bearing. Use an arbor press to install the bearing.

2. Install the brush holders on the frame end and fit the frame end over the frame. The end may be drawn on by tightening the frame screws.

3. Route coil leads 1, 2, and 3 through the smaller frame opening, and lead 4 through the larger opening.

4. Run lead 1 behind and around the field coil terminal.

5. Twist leads 1 and 3 together and secure them to the field coil terminal with the terminal screw.

6. Install the positive brush. Twist leads 2 and 4 together and secure them to the positive brush terminal.

7. Assemble the negative brush only when lead 3 is positioned correctly behind the frame screw.

8. Assemble the commutator end of

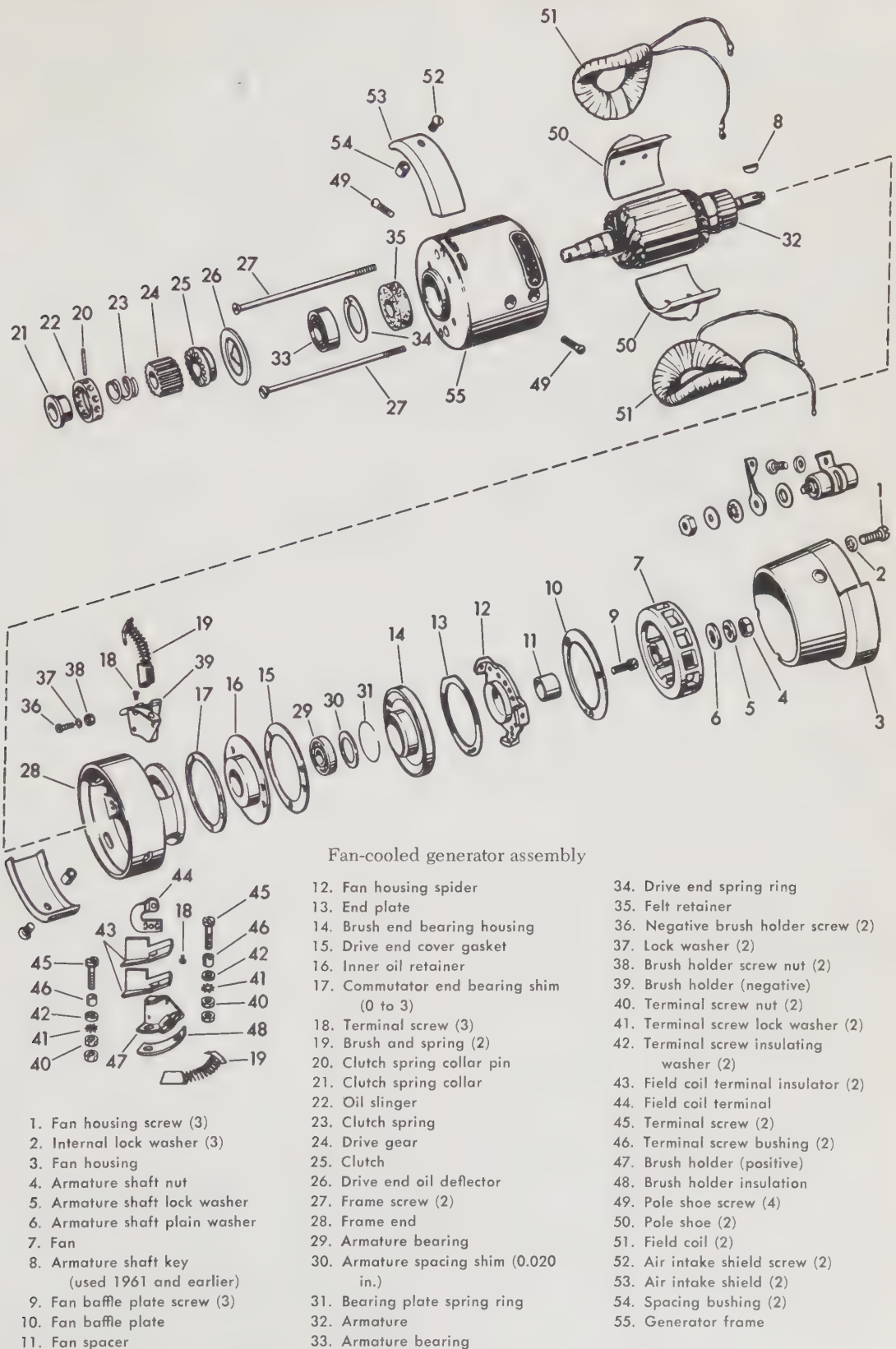


Figure following name of part indicates quantity necessary for one complete assembly.

the generator in reverse order of disassembly making sure that the same number of shims are used.

ALTERNATOR EQUIPPED MODELS

An alternator is used on 1970 and later models, rather than the standard generator. The difference is that an alternator produces an alternating current while a generator produces direct current. Initial voltage still comes from the battery as DC, but the running voltage produced is AC. This is channeled through a rectifier which converts the AC to DC, then through a regulator which monitors alternator output, and then back to the battery as a DC current.

The stator is a fixed-base field coil composed of wire which is looped into the laminated stator frame. It produces a field which is interrupted by the rotor magnets to produce negative and positive current flow. The rotor is an armature with its own field coil which is the driven member of the alternator assembly.

Alternator Service

REMOVAL AND DISASSEMBLY

1. Disassemble the engine as described in "Engine and Transmission" until the alternator is exposed.

2. Pull the alternator rotor free from the sprocket shaft.

3. Remove the stator securing screws and wire plug, then remove the stator from the engine.

Installation is in the reverse order of removal. Note the following points:

1. Press the rotor onto the sprocket shaft using the Sprocket Shaft Bearing Tool (H-D Part No. 97225-55) until it bottoms firmly against the seal spacer.

2. Apply thread-locking compound to the transmission shaft bearing recess in the chain housing and to the shaft.

3. After the bearing housing is tapped into place, pack the race with grease.

4. Use aluminum paint on the chain housing and transmission surfaces where the two meet.

5. Replace the chain housing O-ring in the engine crankcase groove.

6. Replace the cover gasket.

7. Secure the transmission base mounting nuts only after the engine and

transmission are secured to the chain housing.

8. Use a vacuum gauge (H-D Part No. 96950-68) to check the vacuum in the chain housing. With the vent tee hose closed off, the reading should be 20 in. Hg at 1,500 rpm. A lower reading is indicative of an air leak at the gasket, solenoid, starter shaft, or hoses.

ALTERNATOR CHECK

Consult the following tables for alternator performance.

PROBE CONNECTIONS	READING			
	+ Polarity		- Polarity	
	Light	Ohm-meter	Light	Ohm-meter
White to module base (GND)	Off	Infinity	On	3 to 15
White to module base (GND)	Off	Infinity	On	3 to 15
Blue to black	On	3 to 15	Off	Infinity
Red to module base (GND)	Off	Infinity	Off	Infinity

Probe Connections	Reading	Replace Stator
White to white	0.3 to 1.0 ohms	0 indicates
White to blue	Both readings	short
White to blue	the same	circuit
Blue to red	1.5 to 2.0 ohms	
Any pin to module base (GND)	Infinity	Any reading indicates short circuit

REGULATORS

Harley-Davidson uses two-unit voltage regulators and three-unit current and voltage regulators to control generator output. All tests and adjustments should be performed with the cover and gasket in place after at least 15 minutes of normal operation to ensure proper temperature.

The cutout relay is a switch that allows

connections between the battery and the generator to be broken to prevent the battery from discharging through the generator when the engine is stopped or running slowly. The voltage regulator controls the generator voltage output in accordance with the battery draw and state of charge. The current regulator further monitors generator output.

The Bosch and Delcotron regulators used are not repairable and must be replaced if they are malfunctioning. If a Delco-Remy regulator is suspected of improper operation, check the following:

1. Regulator points dirty, oily, pitted, or oxidized. Points may be cleaned with a point file or fine metal sandpaper. Do not try to restore to a like-new condition; replace if doubtful.

2. Adjust the contact relay air gap and contact point gap according to the "Regulator Test Specifications" chart.

3. The ground wire (braided wire between regulator base and mounting bracket) may be broken.

4. Fuse may be blown (fuse holder near regulator).

5. Corrosion of internal components causing malfunction.

If you have a charging system problem and the alternator or generator output check shows that the regulator is probably at fault, the easiest way to verify this is to install a new regulator and recheck the output. The Delco-Remy regulator is adjustable, but in many cases adjustment will not repair it and you can waste a lot of time trying to make it work. Test specifications are provided at the end of the chapter for those who have the equipment to perform the test and adjustments.

1. Clean the contact point surfaces with a point file and remove oil by running a strip of hard paper, soaked in solvent, between them.

2. Be sure the points are properly aligned. If in doubt about point condition, replace them.

3. Replace points by removing the terminal screw and fulcrum pin snap-ring, and by lifting the breaker lever from the pivot stud. Remove the stationary circuit breaker contact.

4. Install points in the reverse order of removal and set the gap (refer to Chapter 3). Do not overtighten the condenser wire.

5. Apply a light coat of grease to the breaker cam whenever the points are replaced or every 5,000 miles. Do not lubricate excessively. The condenser should be replaced whenever the points are replaced.

MAGNETO

Removal—Sportster XLCH

1. Remove the air cleaner and carburetor.

2. Disconnect the spark plug leads and the kill switch terminal wire at the magneto terminal.

3. Remove the tachometer drive assembly (if applicable) and loosen the control wire set screw.

4. Remove the mounting apparatus and lift the shaft and housing clear of the gearcase.

Magneto Spark Check

1. Hold the end of the spark plug lead, with the plug cap removed, about $\frac{1}{8}$ in. from the spark plug terminal. When the engine is running a blue spark should appear twice in every 360° rotation of the engine between the end of the lead and the plug terminal. If the spark is constant, the engine should not misfire. Do this on both plugs.

2. To test for spark with the engine off but the ignition on, hold the lead not more than $\frac{1}{4}$ in. from the plug terminal while kicking the engine over. Perform this on both plugs.

3. An easier test method is to remove the plug, reconnect the wire, and ground the plug tip against the cylinder head. Rotate the engine and watch for a blue spark at the plug tip.

4. If no spark is present, the kill button should be checked for a grounded condition before the magneto is removed for service.

Disassembly and Assembly

1. Remove the end capscrews, end cap, and gasket.

2. Remove the spark plug leads. Remove the plug lead terminal by sliding up the lead protector and prying the terminal off with a screwdriver.

3. Remove the condenser mounting screw, washer, breaker arm terminal screw, condenser, and bracket.

4. Remove the point mounting screws, lockwashers, cam fiber and holder, and stationary contact point.

5. Remove the bearing support screws, safety gap (if applicable), and bearing support. Pry the rotor drive and grease retainer washer free, and remove the rotor cam end bearing.

6. Remove the rotor drive-gear pin by filing one end off and then punching it out.

7. Slip the rotor drive-gear from the shaft.

8. Remove the housing screws and slip the housing off the shaft.

9. Remove the O-ring and retainer washer, and drive out the bushing from within the housing (if applicable).

10. Remove the rotor drive and seal outer washer, rotor drive end seal, rotor drive, and grease retainer washer, then force the rotor drive-end snap-ring from the rotor shaft and remove the rotor.

11. Remove the rotor drive-end snap-ring and bearing.

12. Remove the coil bridge set screws, coil, and coil lead springs.

13. Remove the primary ground switch terminal and terminal switch wire.

14. Remove the vent cover screws, cover washers, cover, and screens.

15. Assemble in the reverse order of disassembly, taking care not to severely jar the rotor since this could cause damage.

Ground Switch Lock

DISASSEMBLY

1. Remove the end cap.

2. Remove the retainer clip between the insulating block and housing. This is best done by depressing the retainer clip with a knife, using the key in the switch as a lever, and pulling the key out to exert pressure while turning slightly to pull the lock out of the housing.

3. Remove the ground lock spring and lock ball from the ground-switch insulating block screw hole.

ASSEMBLY

1. With the retainer clip on top of the inside switch housing, insert the ground switch lock into the housing.

2. Depress the body retainer clip and

push the ground lock switch into the housing, with a knife, so the clip engages the housing.

3. Loosen the condenser screw so the ground switch insulating block screw can be removed.

4. Replace the block screw and switch wire.

5. Replace the lock ball and lock spring.

6. Replace the switch insulating block wire and screw, and tighten the condenser screw.

7. Assemble the magneto in the reverse order of disassembly.

INSTALLATION

1. Set the oil seal ring and gasket (if applicable) in place on the gearcase.

2. Mount the magneto adaptor plate.

3. Install the magneto adaptor bolts from inside and tighten the assembly screws.

4. Manual retard magnetos must have the adaptor plates (47A and 47B) installed together.

5. Insert the rotor shaft into the gearcase and secure the magneto on the adaptor plate.

6. Manual retard magnetos must have the control arm installed before the mounting bolts can be replaced.

Contact Breakers

CONTACT BREAKER ASSEMBLY REMOVAL

1. Before attempting to remove the contact breaker assembly, thoroughly clean the crankcase area around the unit as well as the contact breaker itself. To make sure that no dirt falls into the crankcase, have a clean oil soaked cloth handy to hold around the crankcase as the shaft is withdrawn.

2. On manual advance units, remove the contact breaker cover and cover retainer, then disconnect the spark control wire from the contact breaker cover.

3. On automatic advance units, remove the screw and lockwasher from the contact breaker cover and then remove the cover.

Sportster

1. On 1965 models, remove the nuts and washer which secure the contact breaker base to the stem and remove the base.

2. Remove the two screws and the washer which secure the shaft and housing to the gearcase cover, and lift the shaft and housing free from the gearcase cover.

3. On 1966 automatic-advance types, remove the stem clamp bolts and clamp to free the entire unit clear from the crankcase.

Glide Models

1. On 1965 automatic-advance types, remove the nuts and washers, then slip the base from the housing. Now the entire unit is free to be lifted from the gearcase housing.

2. On 1966 automatic-advance types, upon removal of the stem clamp nut and clamp, the entire unit is free to be lifted clear of the gearcase cover.

1970 and Later Case-Mounted Contact Breaker

1. Remove the contact breaker and gasket by removing the cover screws.

2. Remove the wire terminal and wire from the breaker points.

3. Remove the contact breaker cam bolt, breaker plate bolts, lockwashers, and washers or screw retainer (which-ever is applicable).

4. Remove the breaker assembly and free the contact assembly from the breaker plate by removing the breaker contact screw. Free the condenser lead and flat spring from the breaker contact terminal post. Remove the condenser screw, lockwasher, and condenser.

5. Remove the breaker cam and advance assembly.

6. Free the flyweight spring hooks from the pivot pin grooves and slip the fly-weights from the pivot pins. Springs need not be removed unless replacement is necessary. Flyweight roll pins are a press fit and need not be removed unless replacement is necessary.

INSPECTION

Before inspecting any parts, the entire contact breaker should be cleaned with a cloth and proper solvent.

If the fiber follower is badly worn, the points should be replaced. If the points are excessively burned or pitted, and cannot be cleaned to serviceable state, they should be replaced. A good rule of thumb is: replace when in doubt.

Always use a clean, fine-cut contact point file when cleaning points; never use emery cloth or rough sandpaper. Never use your point file or any other type of metal and always clean it before use if it is dirty or oily. If absolutely necessary, fine-grade metal sandpaper can be used. If residue is left on the point surfaces, particles will be embedded causing arcing and rapid burning of the points.

Using a spring gauge, determine whether the point pressure is within 14–18 oz. If not, replace, since excessive pressure causes rapid wear of fiber, cam, and point surface, while insufficient pressure causes high-speed point bounce which leads to arcing, burning, and engine miss. Be sure also that the point faces seat evenly. If not, adjustment can be made by bending the contact plate.

Procedures

1. Loosen the wire stud screw, lift off the condenser wire and connection, and lift away the contact breaker lever. Remove the lock screw and contact point support.

2. Lubricate the breaker cam with a trace of grease, taking care not to overlubricate, which would cause point burning, and lubricate the shaft with light grease (i.e., Delco-Remy No. 1960954). Take care to replace the cam in the same position on the shaft. This should be done every 500 miles.

3. Assemble the points in the reverse order: brass washer, condenser wire end, and stud screw, with the lever notch aligning.

4. Adjust the point gap and ignition timing.

5. Check the contact breaker advance flyweight action (if applicable) by moving the cam until the weights reach their stop. Releasing the cam should bring it back to a fully retarded position due to spring action. Replace weak springs as necessary.

6. Check to see if the flyweight ears, which engage slots in the cam, are worn

or if the cam is loose on the spindle, and replace if necessary.

7. If either the base pivot stud or the base is worn or damaged, replace it. The base should turn freely but not loosely. If the base has excessive stem clearance, the gap will vary.

8. The condenser cannot be repaired. If a faulty condenser is suspected, observe for an open or short circuit. An open circuit will cause excessive arcing at the points and a shorted circuit will result in no noticeable spark. Replace the condenser if it is defective and note whether or not performance is improved.

9. Inspect the coil-to-contact breaker low-tension wire, wire stud insulator, and fiber washer for a brittle or cracked condition. Replace if defective.

10. To disassemble the advance mechanism, pry the clips loose from the stem plate. Inspect the teeth and worm gear for wear or damage. Check for excess side and end-play (in excess of 0.008 in.) as this will affect timing and allow oil seepage onto the points.

11. If the timer stem is to be rebushed, drive out the old bushings and replace them. Spacer washers of 0.062 in., 0.066 in., 0.072 in., or 0.076 in. can be used to obtain 0.001–0.007 in. of shaft end-play.

12. When assembling the shaft in the stem, secure the gear and spacer washers to the shaft with a new steel pin riveted in place. Make sure that the shaft moves freely in the stem.

INSTALLING CONTACT BREAKER

1965 Electra-Glide Automatic Advance

1–2. Consult the previous section.

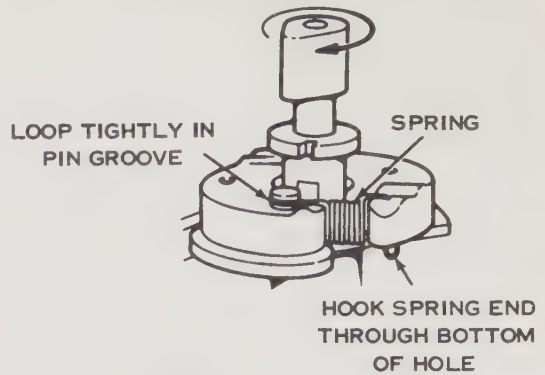
3. Lubricate the cam end of the shaft and stem assembly, and install the breaker cam on the shaft so that the notches in the cam engage with the flyweights.

4. Place the breaker base on the stem and shaft assembly and temporarily secure it.

5. The stem and base can only mount correctly in one way due to the stud positions. Check by aligning the base timing marks.

6. Install a new breaker rubber seal.

7. Turn the shaft counterclockwise



Advance assembly

60 degrees from the position at which the cam mark and fiber align.

8. Temporarily insert the stem into the gearcase with the timing base marks away from the engine.

9. Align the flywheel timing mark in the fully retarded position.

10. Adjust the gear engagement, one tooth at a time, until the fiber and the cam mark align and secure the assembly to the gearcase.

11. Adjust the ignition timing.

1966 and later Electra-Glide and Sportster Automatic Advance

1–4. Consult the previous section.

5. Install a new rubber seal.

6. Before installing, turn the shaft to approximately align the cam mark with the fiber follower.

7. Insert the breaker into the gearcase with the cable toward the rear of the engine. This will position the points to the outside of the engine to facilitate adjustment.

8. Align the flywheel timing mark in the center of the inspection hole and observe the position of the cam mark and fiber.

9. Lift the assembly and turn the shaft gear, one tooth at a time, until the cam mark and fiber align. Install the stem clamp and secure the assembly to the gearcase.

10. Adjust the ignition timing.

1970 and Later Case-Mounted Contact Breaker

1. Consult the previous section.

2. Assemble in the reverse order of disassembly.

3. Lubricate the cam with a light appli-

cation of High Temperature Grease (H-D Part No. 99862-72) during assembly, and thereafter at every 5,000 miles, or use any heavy grease if the aforementioned product is unavailable.

4. Seat the advance assembly squarely and firmly on the camshaft end.

5. Adjust the point gap as described in "Contact Point Adjustment." The gap must be within 0.016–0.020 in. for both cams if damage is to be averted. Loosen the breaker cam bolt and rotate the advance mechanism toward the points, at their widest setting, to equalize the gap settings.

Starting System

Harley-Davidson uses a 12 volt, series field, four-pole starter motor which uses a Bendix-type drive and a reduction gear to engage the clutch ring gear. A solenoid relay allows the battery current to connect directly with the motor when a button is depressed on the handlebar. Some models have a cutout switch for the control circuit which prevents the starter from operating when the transmission is in gear.

TROUBLESHOOTING

If the engine doesn't start after 30 seconds of operating the starter motor, let the starter cool for no less than two minutes before operating it again.

1. If the starter motor doesn't turn at all, the trouble is either a dead battery or, more likely, a disconnected wire. Check the mounting and wiring connections of the starter first, and then check the battery and return circuits. The solenoid switch should be mounted firmly. All connections must be clean and secure for effective operation.

2. Check the battery for charge by noting the brightness of the headlamp or by using a hydrometer. If the battery is charged and the wiring is good, the problem is either the starter, the switches, or the engine itself.

3. If the battery is charged, the problem may be in the switches. This can be checked by bypassing each switch with a jumper.

4. If the engine oil viscosity is too great, or if the bearings or pistons are too tight, the engine may not turn over. If the engine can be kicked over with the normal amount of effort but the starter won't turn it over (assuming the battery is charged), the starter motor is probably faulty.

DELCO-REMY STARTER MOTOR

Disassembly

1. Remove the thru-bolts, nuts, and lockwashers. The bolt which lies nearest the field coil has a vinyl insulating sleeve which must be removed carefully.

2. Remove the commutator end frame and drive end frame. If they don't slide off, tap them gently with a soft mallet.

3. Press or tap the armature from the drive end of the frame.

4. Remove the pole shoe screws, terminal nuts, lockwashers, insulating washers, terminal screw, field coils, and pole shoes.

5. If the brushes are grounded or the holders are defective, remove the brush holders by drilling out the rivets. If done carefully, a cold chisel can be used.

6. Remove the brush springs by turning them clockwise after compressing one side with a screwdriver until the springs leave their seats.

7. Remove the insulated brush by cutting off the lead where it joins the field coil wire.

Assembly

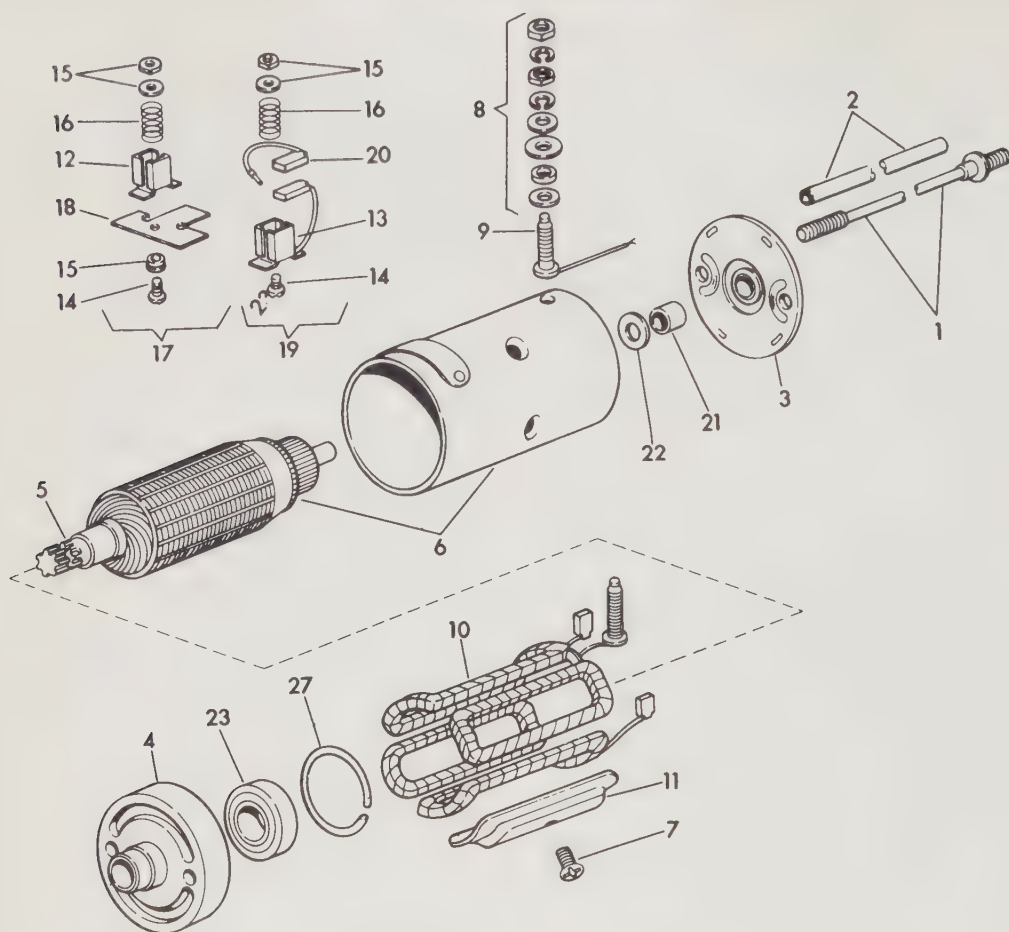
Refer to the following section on Prestolite starter motors. Procedures are the same.

Testing the Frame and Field Assembly

1. Test for an open circuit with a test lamp connected to the terminal screw and insulated brush. An open circuit will keep the lamp from lighting.

2. Test for a grounded field circuit with a test lamp lead on the terminal or on each insulated field coil brush, and the other lead grounded to the frame. If the lamp lights, the circuit is grounded.

3. Check each insulated brush holder for a grounded condition by using a test lamp. Replace any for which the lamp lights.



Delco-Remy four-pole starter motor

4. Replace the field coils if a short is suspected and note whether performance is enhanced.

Testing the Armature

1. Connect a test light or voltmeter between the commutator and armature core.

2. If the light comes on (or the meter responds), the armature coil is grounded and the armature should be replaced.

Armature Repair

1. Place the armature in a lathe and turn down the commutator if it is worn, out of round, or if the mica insulation protrudes above the segments. This should only be done by an experienced mechanic.

2. Undercut the mica $\frac{1}{32}$ in. with an undercutting machine or a hacksaw

blade. Be sure that the mica surface is flat and even, and is kept free of dirt and copper dust.

3. Lightly sand the commutator with "00" sandpaper to ensure a smooth surface.

4. Examine the bearing, bushing, and thrust washer for damage and wear (i.e., excessive play), and replace if in doubt.

5. Information concerning armature testing may be obtained through Delco-Remy, but replacement is advised over repair.

Brush Replacement and Repair

1. Complete replacement sets are available for brushes, grounded holders, and insulated holders.

2. Prepare to replace the insulated brush by cleaning the coil lead end with a file or grinder.

3. Prepare the surface for soldering with rosin flux or use a flux-based solder. Only remove varnish from the leads in the area to be soldered.

4. Solder the coil lead to the back side of the coil, taking care not to use excessive amounts of solder. Solder must never contact the armature. Overheating the brush lead will cause the solder to run onto the wire strands, making the lead inflexible.

5. When replacing the grounded brush,peen the brush holder mounting screws with a hammer so that the nuts won't vibrate loose.

PRESTOLITE STARTER MOTOR

Disassembly

1. Remove the thru-bolts, washers, lockwashers, and commutator end cover.

2. Insert a tube the diameter of which exceeds that of the commutator. This will keep brushes in place and allow the armature to be replaced without touching the brushes.

3. Remove the armature, drive end cover, and bearing as one assembly. The bearing may have to be pressed out.

Testing the Frame and Field Assembly

1. Coils can only be tested for an open circuit; any type of coil failure requires replacement of the frame and field assembly.

2. Touch one test lamp lead to the frame and the other to each field coil brush. The lamp should light on each brush; failure to do so indicates an open circuit.

Brush Replacement and Armature Repair

Same as for Delco-Remy starter motor.

Assembly (All Models)

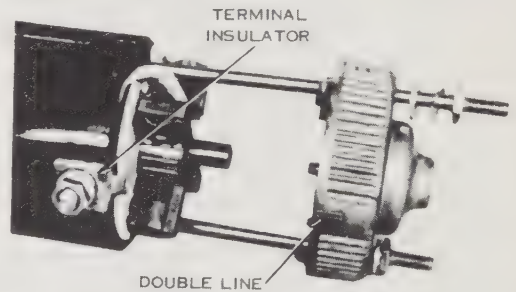
1. If the brushes and springs have been released, clamps can be used to hold them in place while reinstalling the armature.

2. Align the end cover mark to the motor terminal.

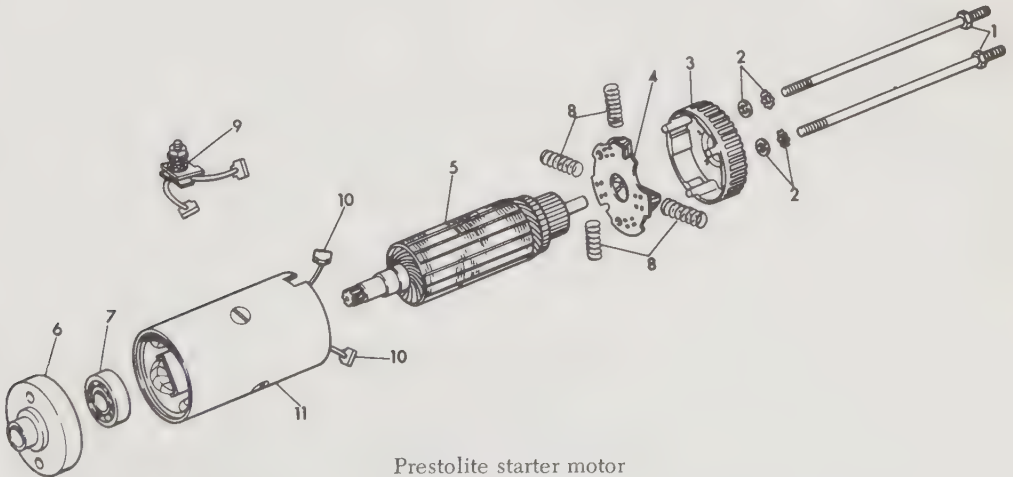
3. Align the brush holder positioning notch with the motor terminal insulator.

4. Align the commutator end head with the motor terminal.

5. Install the thru-bolts, washers, and lockwashers, and mount entire unit on engine.



Aligning starter motor cover



Prestolite starter motor

- | | | |
|------------------------------------|---------------------------|-----------------------------------|
| 1. Thru bolt | 5. Armature | 9. Terminal and brush assembly |
| 2. Washer and lockwasher (2) | 6. Drive end cover | 10. Ground brush (2) |
| 3. Commutator end cover | 7. Drive end ball bearing | 11. Frame and field coil assembly |
| 4. Brush plate and holder assembly | 8. Brush spring (4) | |

Ignition System

IGNITION COIL

The ignition coil functions as a pulse transformer which increases low battery or generator voltage to the high voltage necessary to produce a spark which will jump the distance of the spark plug gap. It consists of primary and secondary windings about a laminated iron core. It is sealed with an immovable, waterproofed case and cannot be repaired.

If, after checking the battery, plugs, points, and condenser, there is no spark, replace the coil. Before doing so, a new coil can be hooked up to see if the problem has been eliminated.

When replacing the cable, warm the coil, so that the sealing compound will soften, by turning on the key with the points closed. Prepare the new cables by rounding the ends so they will follow the holes left in the compound and dip the end in light oil. As soon as the old cable is removed, replace it with the new, applying sufficient pressure to skewer it on the brass pin at the cable base.

Be careful not to overheat the compound because the holes will close too quickly and will interfere with the replacement. If this happens, allow the coil to cool and then open a hole, by inserting a tube with a jagged edge, which will collect the interfering compound. This tube should be slightly larger in diameter than the cable. If positive contact with the brass pin isn't made, the coil will not function properly.

NOTE: Service procedures for the points, condenser, spark plugs, etc., will be found in Chapter 3.

Switches

IGNITION-LIGHT SWITCH

This switch is centrally located in the instrument cluster on most models and has three positions plus a center-off position. One click to the right turns on the ignition, a second click to the right is for the ignition and running lights. One click to the left, from the center-off position, is

for parking lights only, and, in this and the center-off position, the ignition can be locked off. The key can be removed in any position, on most models, once the ignition has been unlocked.

Disassembling Ignition-Light Switch

1. On Glide models, remove the instrument panel cover by prying out the clip located by the trip mileage knob and by removing the center screw below the speedometer. The switch must be unlocked in the "off" position.

2. Disconnect all of the wires that are connected to the switch and remove the mounting screws.

3. Grasp the end of the roller contact retainer with pliers and lift up and away from the roller contact.

4. Remove the roller contact and switch mounting plate assembly. Take note of the position of the mounting plate.

5. The reinforcing plate, contact bar holder, and rubber contact retainer can be removed from the cover by slipping it sideways until one set of tabs clears the slot in the cover, then lifting and sliding in the opposite direction.

6. Remove the switch base and lock plate from the cover. Note that the narrow end of the elongated hole and the lug on the switch cylinder are toward the lock cover hinge.

7. Remove the switch cylinder and cylinder case from the cover. Only remove the cylinder from its case if the lock is faulty. Some models have the cylinder and case as a single unit.

Cleaning and Inspection

1. Wash all parts in solvent and dry them with compressed air.

2. Inspect all of the parts for excessive wear, particularly the contacting buttons and roller surfaces. Extreme wear may cause a short of the roller retainer against the lock plate.

3. Replace all worn and/or rusted parts.

Assembling Ignition-Light Switch

1. Apply a light coat of grease to the head of the roller retainer, lock plate, roller contact, and contact buttons on the mounting plate.

2. Reposition the lock cylinder into the housing with the tumblers in any of the four registers.

3. Insert the key, while pressing the cylinder into the housing, and turn it to the right until it stops.

4. Remove the key and complete assembly.

5. Complete assembly by using the reverse order of the disassembly procedures.

SOLENOID SWITCH

The solenoid switches open and close the circuits electromagnetically. The 1967 Sportster and all Glide models have switches which can be repaired. There are three connections involved with the solenoid; these are: the control circuit wire, which runs from the starter button to the small terminal stud; the battery cable, which is connected to the largest stud; the starter motor cable, which runs to the large, shorter stud. Proper installation is a must because reversed cables will cause the solenoid coils to remain in circuit and will drain the battery.

When a faulty switch is suspected, tests should be made of the coil windings and the continuity of the circuit through the main switch when the contacts are closed, in the following manner:

1. Connect the positive terminal of a 12 volt battery to coil terminal 1 and the negative lead to coil terminal 2.

2. This should actuate the solenoid and an audible click should be heard. A heavy spark, or no click, indicates either an open or shorted condition and the switch must be replaced.

3. Connect a jumper wire between terminal 1 and the small solenoid terminal that connects to the starter button lead. If the solenoid is heard to operate, but the

circuit to the starter motor is still incomplete, the solenoid contacts are probably burnt or eroded.

Lights

Headlights on all models are sealed-beam units which must be replaced if either the filament burns out or the lens breaks. If the seal breaks, the reflector quickly tarnishes and the light output is reduced. Use only the units recommended to make sure that proper voltage requirements are met.

Glide model lights are removed by unfastening three retaining ring screws and a retaining ring. Some models have a spring which retains the retaining ring. Make sure that the connector block contacts are clean to ensure a good circuit.

XLH Sportster models produced before 1967 have a mounting nut beneath the housing and a screw on the bottom of the headlight door. Free the sealed beam from the rim by prying the retaining springs free from the headlight door. To replace the entire assembly, the handlebar clamps front cover must be removed. The nut securing the light to the fork must be removed also. XLH and XLCH models after 1966 have a rubber mounting and a screw on the retaining ring. Mounting nuts are located under snap plugs on the mounting bracket.

BEAM ADJUSTMENT

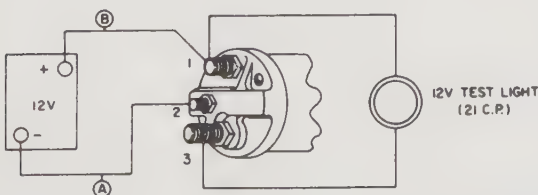
1. Draw a horizontal line on a wall at the height of the center of the light.

2. With the motorcycle on a level surface, about 25 feet away, turn the beam on the test line.

3. Have someone sit on the machine, rather than using the center stand, and be sure that the tires have the correct amount of air.

4. The top of the main circle of light produced by the high beam should be even with the test line.

5. Adjust the light for center position so the beam is perpendicular to the line of the handlebar.



Wiring for testing 1967 Sportster and Electra Glide solenoid

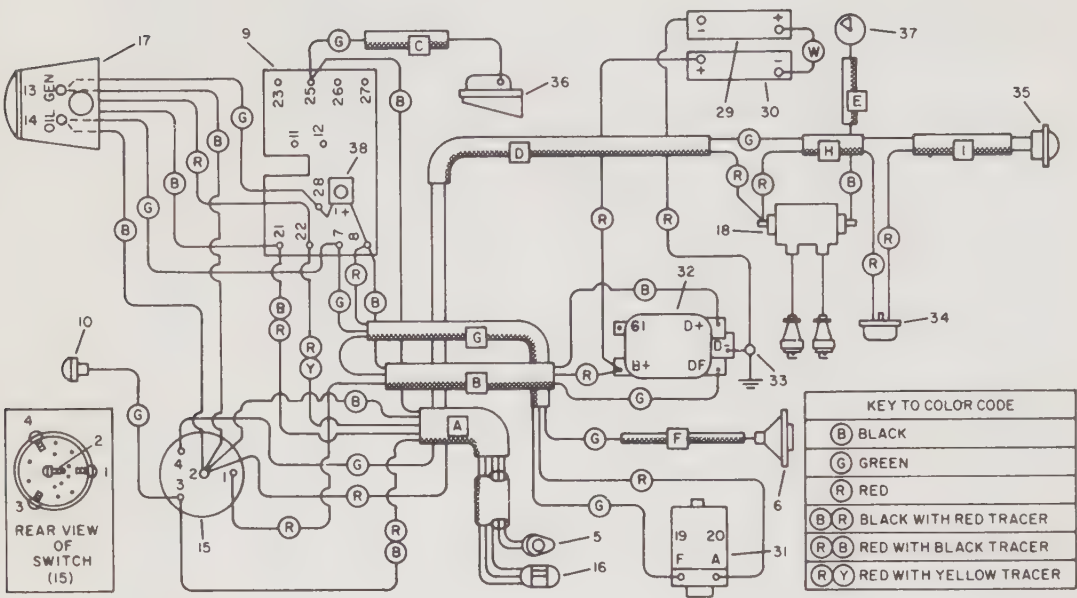
Delco-Remy Regulator Test Specifications

Delco-Remy Regulators					
Regulator Part Number		For Testing Procedure See Delco-Remy Service Bulletin Number	Adjustment and Range Amps	Adjustment and Range (Volts)	
Harley-Davidson	Manufacturer's Number			Current Regulator Setting	Cutout Relay Closing Voltage
74510-64	1119 614	1R 119A	10 (9.0-11.0)	12.4 (11.8-13.0)	14.3 * (13.9-14.5) *
Model 64 and later 12V generators (* Upper contact operation. Operation on lower contacts must be 0.1 to 0.3 volt lower)					
74510-65	1100 687	1R 262	2 Unit Voltage	12.5 (11.5-13.5)	14.4 * (13.5-14.9) *
Delcotron Alternator					
All 12-Volt Regulators					
Current regulator air gap 0.075 in.			Cutout relay air gap and point opening 0.020 in.		
Voltage regulator air gap varies with setting			Voltage regulator point opening 0.016 in.		
Bosch Regulators					
Manufacturer's Number		Relay Cut-in Voltage	Regulator Voltage		Used with Harley-Davidson Generator and Motorcycle Models
Harley-Davidson			No Load	Load	
74511-65	TBA 130-150/12/2	12.4-13.1	13.8-15.4	12.7-14.5 @ 10 amp	1965 Model 65 Generator for 1965-66 Sportster XLH and 1965 and later XLCH

Bulb Chart

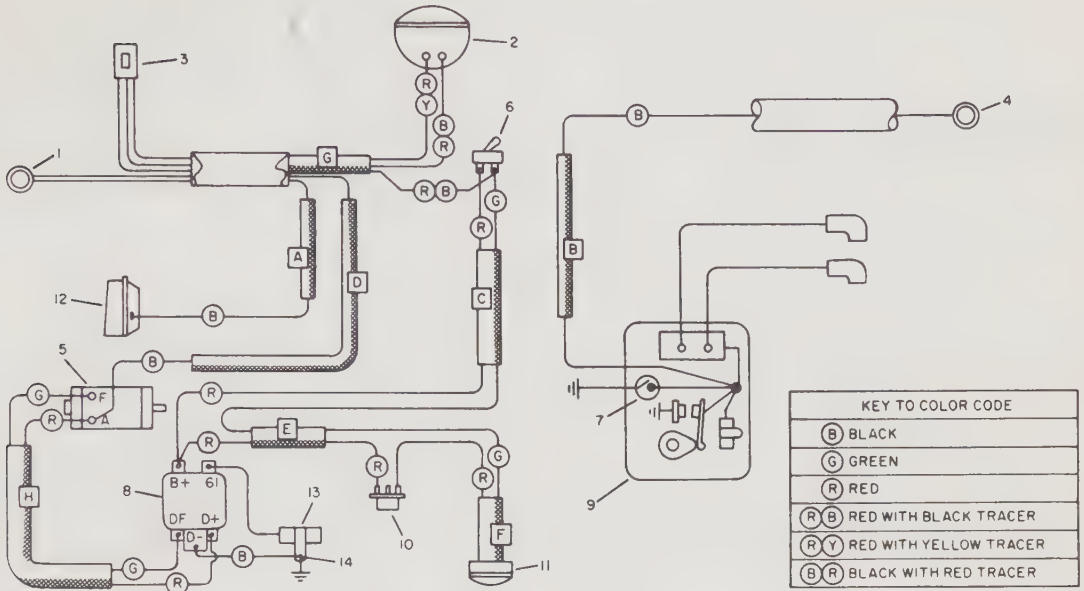
Model	Lamp Description	Bulbs Rqd	Candle Power or Wattage	Harley-Davidson Part Number
			12 V	12 V
GLIDE MODELS	HEADLAMP	1		67717-64
	Hi Beam		50 Watts	
	Lo Beam		45 Watts	
	TAIL AND STOP LAMP	1		68165-64
	Tail Lamp		4 CP	
	Stop Lamp		32 CP	
	INSTRUMENT PANEL			
	Generator Signal Light	1	2 CP	68462-64
	Oil Pressure Signal Light	1	2 CP	68462-64
	Speedometer Light	1		71090-64
	Neutral Indicator Light	1	2 CP	68462-64
	High Beam Indicator	1	2 CP	68462-64
	ACCESSORIES			
	Spot Lamp (Bulb Type)	1	32 CP	68715-64
	Spot Lamp (Sealed Beam Type)	1	30 Watts	68726-64
	Parking Lamp	—	3 CP	68166-64
	Turn Indicator Lamps	4	32 CP	68572-64A
	Turn Indicator Pilot Lamps	2	1.5 CP	71090-64
SPORTSTER	Headlamp			
	Hi Beam	1	50 Watts	67717-64
	Lo Beam		45 Watts	
	Tail Lamp		4 CP	
	Stop Light	1	32 CP	68165-64
	Generator Signal Light	1	4 CP	71090-65
	Oil Pressure Signal Light	1	4 CP	71090-65
	Speedometer Light	1	2 CP	68462-64
	High Beam Indicator	1	2 CP	68462-64
	ACCESSORIES			
	Spot Lamp (Bulb Type)	1	32 CP	68715-64
	Spot Lamp (Sealed Beam Type)	1	30 Watts	68726-64
	Parking Lamp	—	3 CP	68166-64
	Turn Indicator Lamps	4	32 CP	68572-64A
	Turn Indicator Pilot Lamps	2	1.5 CP	71090-64

Wiring Diagrams



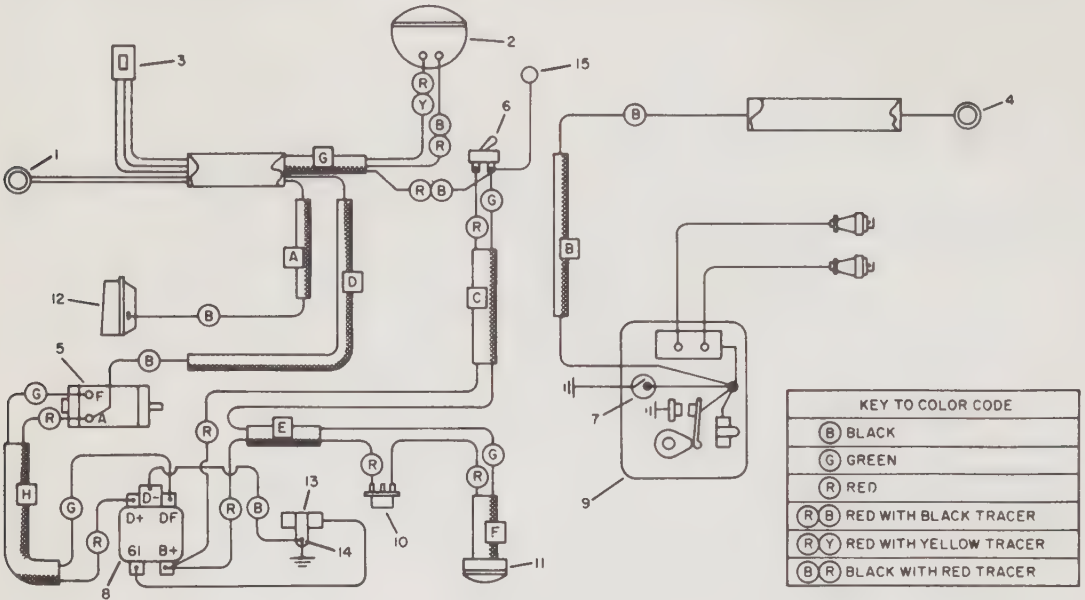
1965-66 Sportster H

- A. Handlebars—Red wire with black tracer, black wire with red tracer, red wire with yellow tracer, two black wires
- B. Conduit (three wires)—Green, red, and black wires
- C. Conduit (one wire)—Green wire
- D. Conduit (two wires)—Red and green wires
- E. Conduit (one wire)—Black wire
- F. Conduit (one wire)—Green wire
- G. Conduit (three wires)—One red and two green wires
- H. Conduit (two wires)—Black and red wires
5. Horn switch—Two black wires
6. Oil signal light switch—Green wire
7. Terminal—Two green wires
8. Terminal—Black and red wires and rectifier positive terminal
9. Terminal plate
10. Speedometer light—Green wire
11. Terminal—Not used with standard wiring
12. Terminal—Not used with standard wiring
13. Generator signal light—Green and black wires
14. Oil signal light—Green and black wires
15. Ignition-light switch—Terminal #1 red wire; terminal #2 red wire and three black wires; terminal #3 green wire and red wire with black tracer; terminal #4 green wire
16. Headlamp switch—Red wire with black tracer, black wire with red tracer, and red wire with yellow tracer
17. Headlamp—Black and red wires
18. Ignition coil—Three red wires and black wire
19. Generator "F" terminal—Green wire
20. Generator "A" terminal—Red wire
21. Terminal—Black wire with red tracer and black wire
22. Terminal—Red wire with yellow tracer and red wire
23. Terminal—Not used with standard wiring
25. Terminal—Black wire and green wire
26. Terminal—Not used with standard wiring
27. Terminal—Not used with standard wiring
28. Terminal—Green wire and rectifier negative terminal
29. Front battery—Negative terminal black wire; positive terminal white wire
30. Rear battery—Positive terminal red wire; negative terminal white wire
31. Generator—See terminals 19 and 20
32. Regulator—B+ terminal two red wires; DF terminal green wire; D+ terminal black wire; Gnd terminal black wire; G1 terminal not used with standard wiring
33. Terminal, frame screw—Two black wires
34. Stoplight switch—Two red wires
35. Tail lamp—Red and green wires
36. Horn—Green wire
37. Circuit breaker—Two black wires
38. Rectifier—Positive terminal (painted red) to terminal #8 Negative terminal to terminal #28



1965 Sportster CH

- | | | |
|--|---|---|
| <p>A. Conduit (one wire)—Black</p> <p>B. Conduit (one wire)—Black</p> <p>C. Conduit (two wires)—Red and green</p> <p>D. Conduit (one wire)—Black</p> <p>E. Conduit (two wires)—Red and green</p> <p>F. Conduit (two wires)—Red and green</p> <p>G. Conduit (three wires) Red wire with black tracer, red wire with yellow tracer, black wire with red tracer</p> <p>H. Conduit (two wires)—Green and red</p> <p>1. Horn switch—Two black wires</p> | <p>2. Headlamp—Black wire with red tracer and red wire with yellow tracer</p> <p>3. Dimmer switch—Red wire with black tracer, red wire with yellow tracer, black wire with red tracer</p> <p>4. Ignition cut-out switch—Black wire</p> <p>5. Generator
"F" terminal—Green wire
"A" terminal—Red and black wires</p> <p>6. Light switch—(3 wires)—Red, green and red with black tracer</p> <p>7. Ignition ground switch lock</p> | <p>8. Voltage regulator—
"61" terminal—Condenser black wire
DF terminal—Green wire
D+ terminal—Red wire and condenser wire
B+ terminal—Two red wires
Gnd terminal—Black wire</p> <p>9. Magneto—Black wire</p> <p>10. Stop light switch—Two red wires</p> <p>11. Tail and stop lamp—Red and green wires</p> <p>12. Horn—Black wire</p> <p>13. Capacitor—Lead connected to regulator "61" terminal</p> <p>14. Grounding screw—Black wire and condenser ground strap</p> |
|--|---|---|

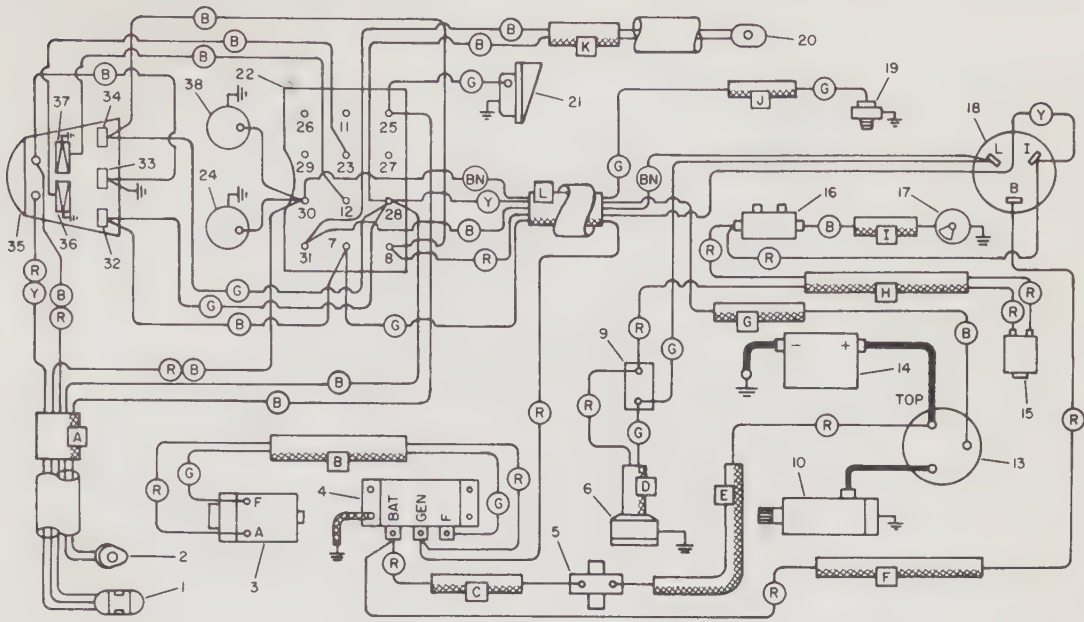


1966 Sportster CH

- A. Conduit (one wire)—Black
B. Conduit (one wire)—Black
C. Conduit (two wires) —Red and green
D. Conduit (one wire)—Black
E. Conduit (two wires)—Red and green
F. Conduit (two wires)—Red and green
G. Conduit (three wires)—Red wire with black tracer, red wire with yellow tracer, black wire with red tracer
H. Conduit (two wires)—Green and red

1. Horn switch—Two black wires
2. Headlamp—Black wire with red tracer and red wire with yellow tracer
3. Headlamp dimmer switch—Red wire with black tracer, red wire with yellow tracer, black wire with red tracer
4. Ignition cut-out switch—Black wire
5. Generator
 "F" terminal—Green wire
 "A" terminal—Black wire
6. Light switch—Red, green and red with black tracer wires
7. Ignition ground switch lock

8. Voltage regulator—
 DF terminal—Green wire
 D+ terminal—Red wire and condenser wire
 B+ terminal—Two red wires
 "61" terminal—Black wire
9. Magneto—Black wire
10. Stop light switch—Two red wires
11. Tail and stop lamp—Red and green wires
12. Horn—Black wire
13. Capacitor—Center black wire connected to regulator "61" terminal
14. Grounding screw—Black wire
15. Speedometer lamp



1967 Sportster H

- A. Handlebar (five wires)—Red wire with black tracer, black wire with red tracer, red wire with yellow tracer, and 2 black wires
 B. Conduit (two wires)—Green and red
 C. Conduit (one wire)—Red
 D. Conduit (two wires)—Red and green
 E. Conduit (one wire)—Red
 F. Conduit (one wire)—Red
 G. Conduit (one wire)—Black
 H. Conduit (two wires)—Red
 I. Conduit (one wire)—Black
 J. Conduit (one wire)—Green
 K. Conduit (two wires)—Black
 L. Conduit (five wires)—Brown, yellow, black, red and green
1. Headlamp dimmer switch
 2. Horn switch
 3. Generator "F" and "A" terminals
 4. Regulator
 "BAT" terminal
 "GEN" terminal
 "F" terminal

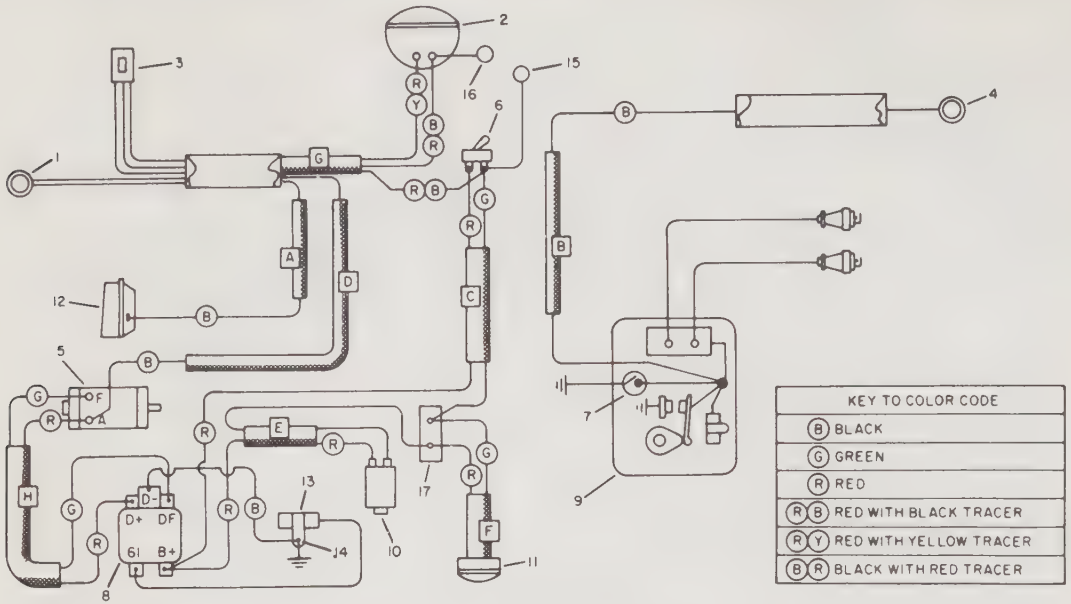
5. Overload circuit breaker
 6. Tail lamp
 7. Terminal
 8. Terminal
 9. Junction terminal board
 10. Starter motor
 11. Terminal—Not used with standard wiring
 12. Terminal
 13. Starter solenoid
 14. Battery
 15. Stoplight switch
 16. Ignition coil
 17. Circuit breaker
 18. Ignition—Light switch
 19. Oil signal light switch
 20. Starter button
 21. Horn
 22. Terminal plate
 23. Terminal
 24. Speedometer light
 25. Terminal
 26. Terminal—Not used with standard wiring
 27. Terminal—Not used with standard wiring
 28. Terminal

29. Terminal—Not used with standard wiring
 30. Terminal
 31. Terminal
 32. Oil signal light
 33. High beam indicator light
 34. Generator indicator light
 35. Headlamp
 36. Left direction signal pilot lamp
 37. Right direction signal pilot lamp
 38. Tachometer light

KEY TO COLOR CODE

- | | |
|----|--------------------------|
| B | Black |
| Y | Yellow |
| BN | Brown |
| G | Green |
| R | Red |
| B | R Black with Red tracer |
| R | B Red with Black tracer |
| R | Y Red with Yellow tracer |

Caution: Disconnect ground cable at battery (—) terminal to prevent accidental starter operation when servicing motorcycle.



1967-69 Sportster CH

- A. Conduit (one wire)—Black
- B. Conduit (one wire)—Black
- C. Conduit (two wires)—Red and green
- D. Conduit (one wire)—Black
- E. Conduit (two wires)—Red
- F. Conduit (two wires)—Red and green
- G. Conduit (three wires)—Red wire with black tracer, red wire with yellow tracer, black wire with red tracer
- H. Conduit (two wires)—Green and red
- I. Horn switch—Two black wires

- 2. Headlamp—Black wire with red tracer and red wire with yellow tracer
- 3. Headlamp dimmer switch—Red wire with black tracer, red wire with yellow tracer, black wire with red tracer
- 4. Ignition cut-out switch—Black wire
- 5. Generator
"F" terminal—Green wire
"A" terminal—Black wire
- 6. Light switch—Red, green and red with black tracer wires
- 7. Ignition ground switch lock

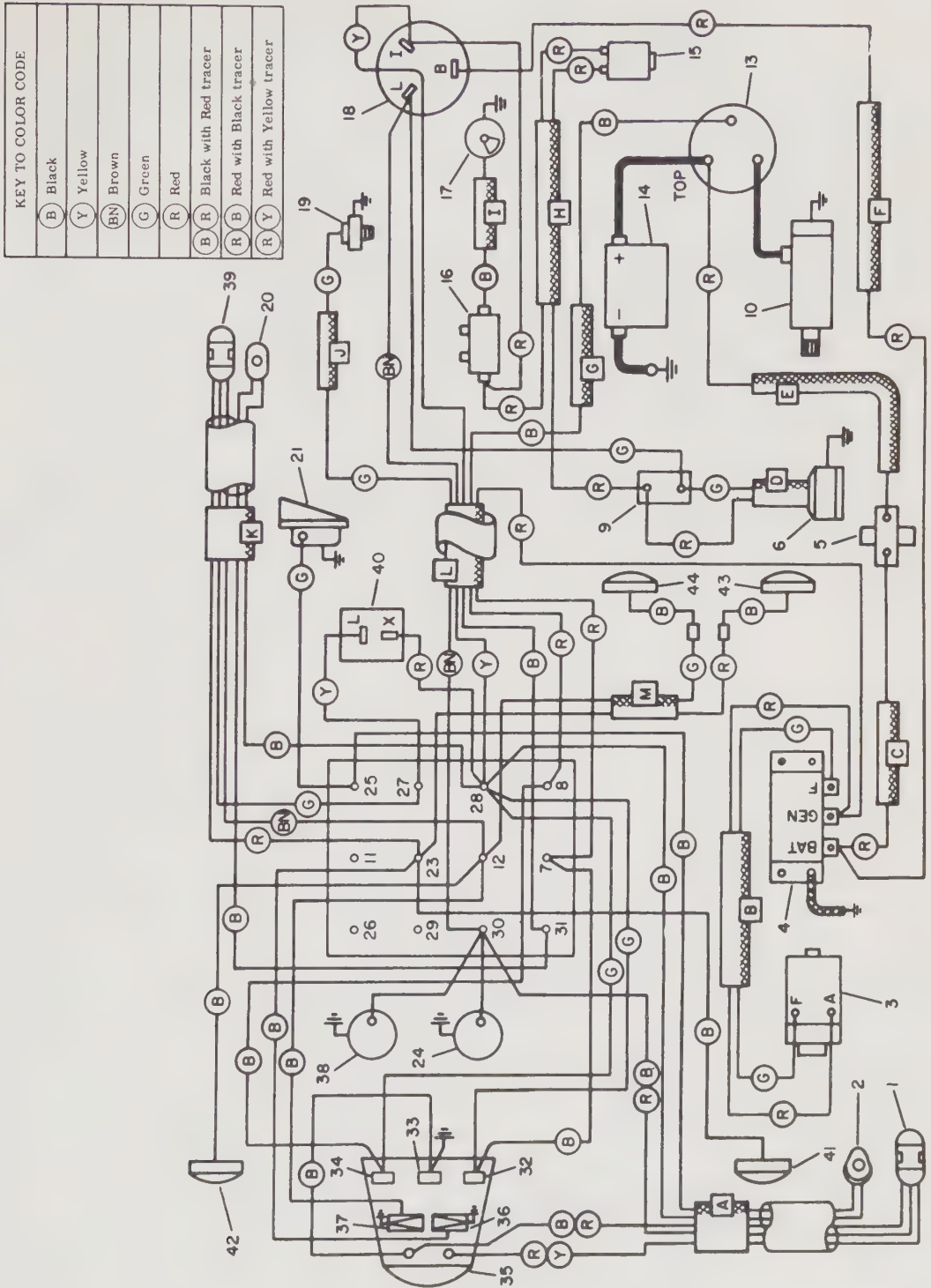
- 8. Voltage regulator—
DF terminal—Green wire
D+ terminal—Red wire and condenser wire
B+ terminal—Two red wires
D- terminal—Black wire
- 9. Magneto—Black wire
- 10. Stop light switch—Two red wires
- 11. Tail and stop lamp—Red and green wires
- 12. Horn—Black wire
- 13. Capacitor—Black wire connected to regular D- terminal
- 14. Grounding screw—Black wire
- 15. Speedometer lamp
- 16. High beam indicator lamp
- 17. Terminal strip

- A. Handlebar (five wires)—Red wire with black tracer, black wire with red tracer, red wire with yellow tracer, and two black wires
- B. Conduit (two wires)—Green and red wires
- C. Conduit (one wire)—Red wire
- D. Conduit (two wires)—Red and green wires
- E. Conduit (one wire)—Red wire
- F. Conduit (one wire)—Red wire
- G. Conduit (one wire)—Black wire
- H. Conduit (two wires)—Red wires
- I. Conduit (one wire)—Black wire
- J. Conduit (one wire)—Green wire
- K. Handlebar (five wires)—Red, brown, green, and two black wires

- L. Conduit (five wires)—Brown, yellow, black, red, and green
- M. Conduit (two wires)—Red and green wires

- 1. Headlamp dimmer switch
- 2. Horn switch
- 3. Generator "F" and "A" terminals
- 4. Regulator "BAT", "GEN", and "F" terminals
- 5. Overload circuit breaker
- 6. Tail lamp
- 7. Terminal
- 8. Terminal
- 9. Junction terminal board
- 10. Starter motor
- 11. Terminal—Not used with standard wiring

- 12. Terminal
- 13. Starter solenoid
- 14. Battery
- 15. Stoplight switch
- 16. Ignition coil
- 17. Circuit breaker
- 18. Ignition—light switch
- 19. Oil signal light switch
- 20. Starter button
- 21. Horn
- 22. Terminal plate
- 23. Terminal
- 24. Speedometer light
- 25. Terminal
- 26. Terminal—Not used with standard wiring
- 27. Terminal—Not used with standard wiring
- 28. Terminal

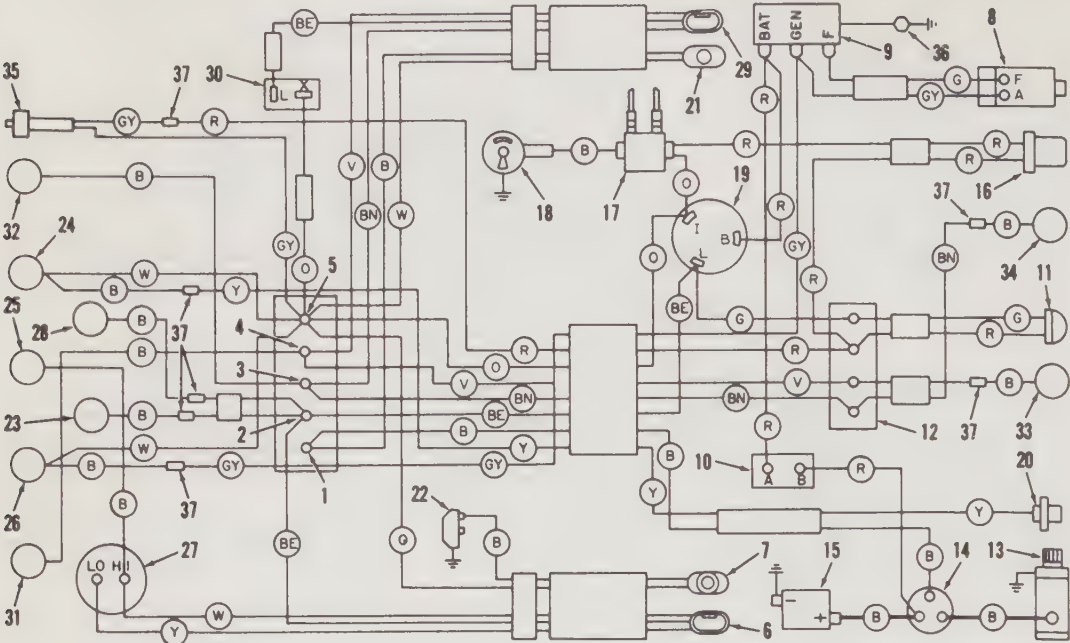


1968-69 Sportster H

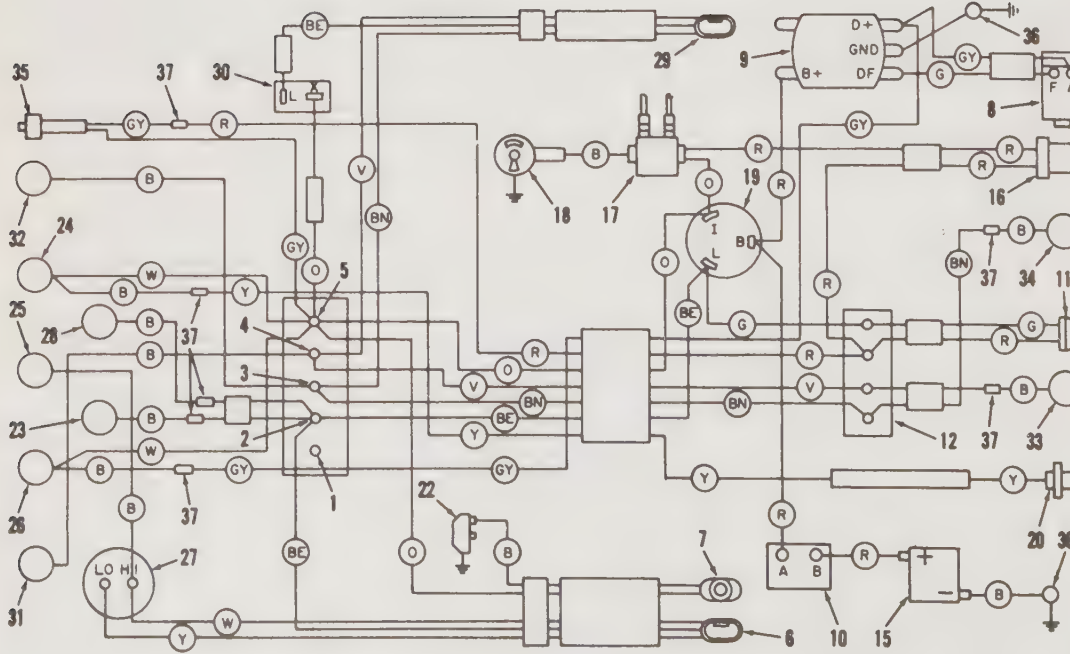
29. Terminal—Not used with standard wiring
 30. Terminal
 31. Terminal
 32. Oil signal light
 33. High beam indicator light

34. Generator indicator light
 35. Headlamp
 36. Left directional signal pilot lamp
 37. Right directional signal pilot lamp
 38. Tachometer light

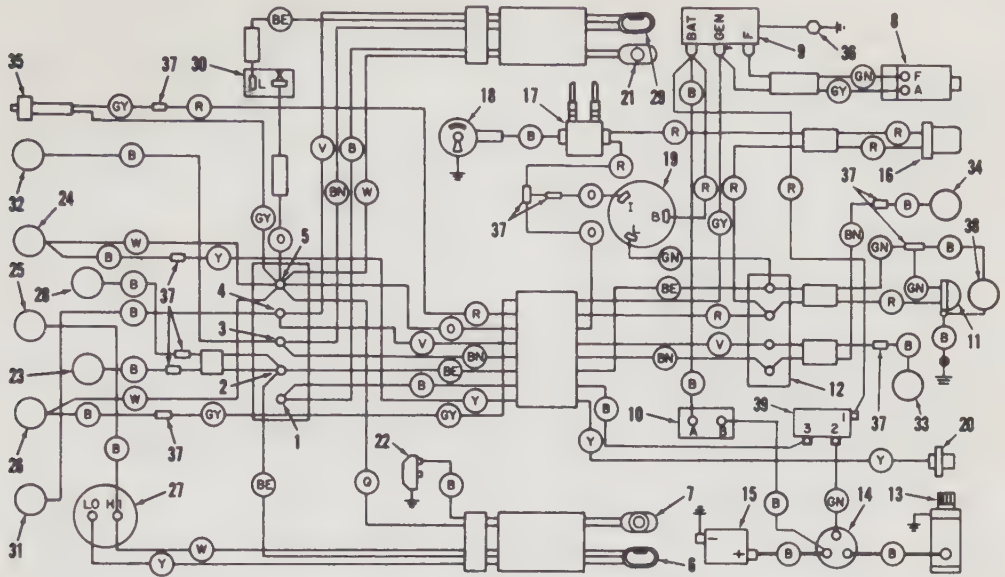
39. Direction signal switch
 40. Direction signal flasher
 41. Left front direction lamp
 42. Right front direction lamp
 43. Left rear direction lamp
 44. Right rear direction lamp



1970-71 XLH



1970-71 XLCH



1972 and later XLH (standard seat)

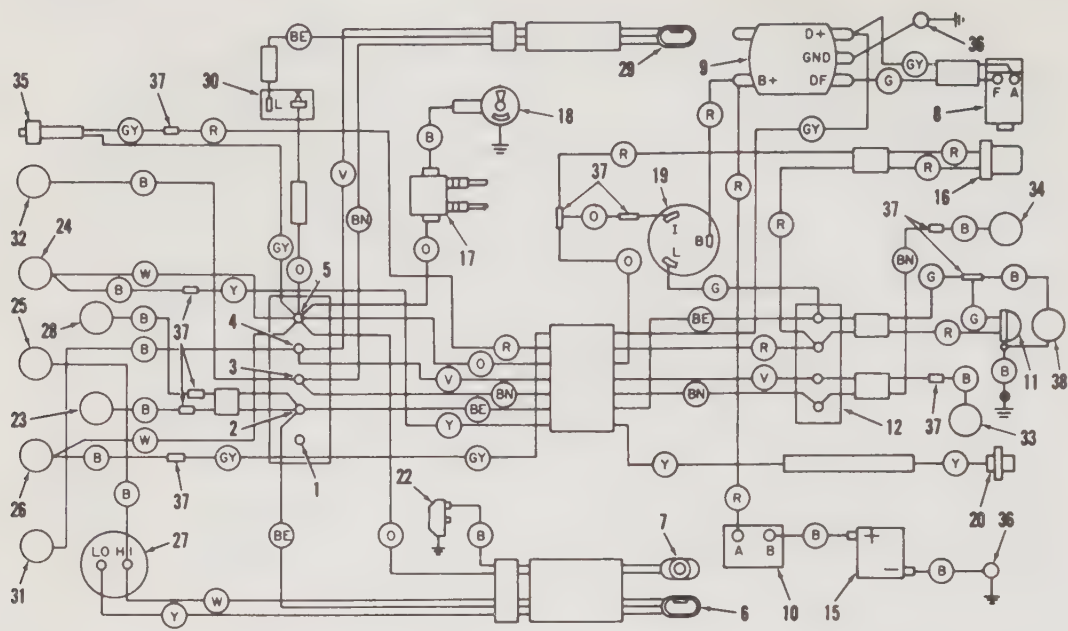
No's 1. thru 5. Fork terminal board
terminals

6. Headlamp dimmer switch
7. Horn switch
8. Generator "F" and "A" terminals
9. Regulator
- "BAT" or B terminal
- "GEN" or D
- "F" or DF terminal
10. Overload circuit breaker
11. Tail lamp
12. Junction terminal board
(4 terminals)
13. Starter motor (XLH)
14. Starter solenoid (XLH)
15. Battery
16. Rear stoplight switch
17. Ignition coil
18. Ignition circuit breaker
19. Ignition—light switch

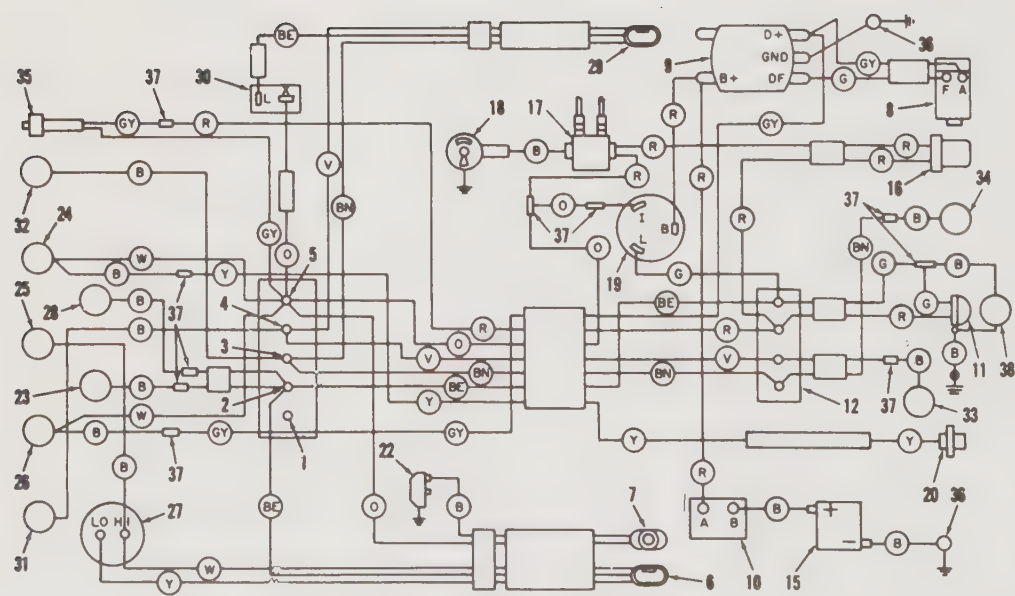
20. Oil signal light switch
21. Starter button (XLH)
22. Horn
23. Speedometer light
24. Oil signal light
25. High beam indicator light
26. Generator indicator light
27. Headlamp
28. Tachometer light
29. Direction signal switch
30. Direction signal flasher
31. Left front direction lamp
32. Right front direction lamp
33. Left rear direction lamp
34. Right rear direction lamp
35. Front stoplight switch
36. Crankcase bolt
37. Connector
38. License lamp
39. Starter relay (XLH)

KEY TO COLOR CODE

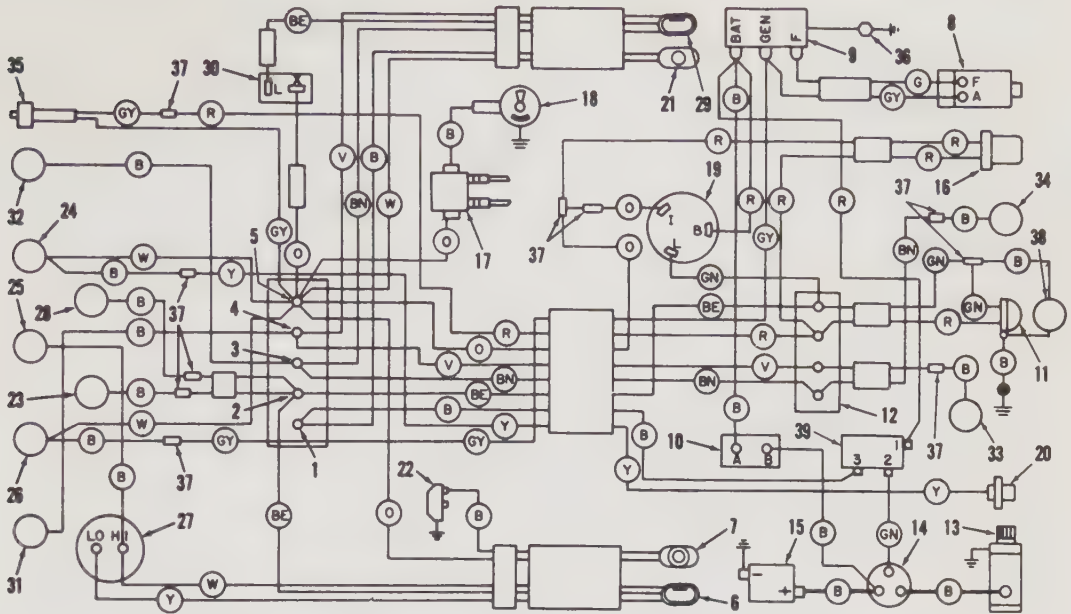
B	BLACK
W	WHITE
O	ORANGE
R	RED
G	GREEN
Y	YELLOW
V	VIOLET
BE	BLUE
BN	BROWN
GY	GRAY



1972 and later XLCH (low seat)



1972 and later XLCH (standard seat)



1972 and later XLH (low seat)

No's 1. thru 5. Fork terminal board terminals

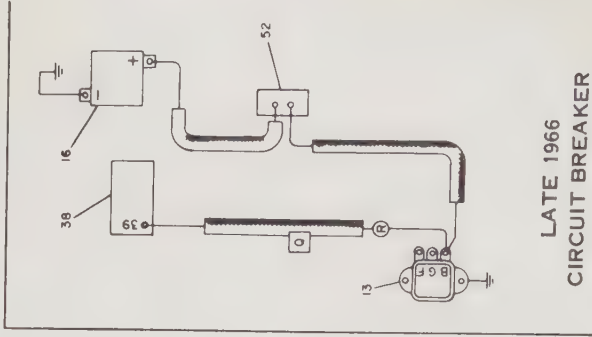
- 6. Headlamp dimmer switch
- 7. Horn switch
- 8. Generator "F" and "A" terminals
- 9. Regulator
 - "BAT" or B terminal
 - "GEN" or D
 - "F" or DF terminal
- 10. Overload circuit breaker
- 11. Tail lamp
- 12. Junction terminal board (4 terminals)
- 13. Starter motor (XLH)
- 14. Starter solenoid (XLH)
- 15. Battery
- 16. Rear stoplight switch
- 17. Ignition coil
- 18. Ignition circuit breaker
- 19. Ignition—light switch

- 20. Oil signal light switch
- 21. Starter button (XLH)
- 22. Horn
- 23. Speedometer light
- 24. Oil signal light
- 25. High beam indicator light
- 26. Generator indicator light
- 27. Headlamp
- 28. Tachometer light
- 29. Direction signal switch
- 30. Direction signal flasher
- 31. Left front direction lamp
- 32. Right front direction lamp
- 33. Left rear direction lamp
- 34. Right rear direction lamp
- 35. Front stoplight switch
- 36. Crankcase bolt
- 37. Connector
- 38. License lamp
- 39. Starter relay (XLH)

KEY TO COLOR CODE

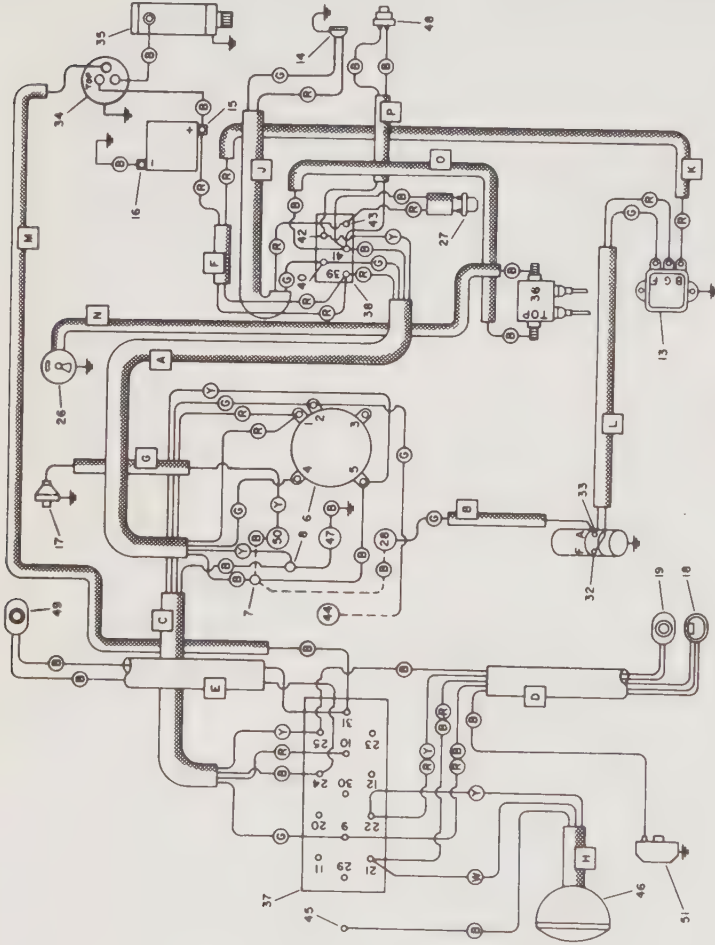
B	BLACK
W	WHITE
O	ORANGE
R	RED
G	GREEN
Y	YELLOW
V	VIOLET
BE	BLUE
BN	BROWN
GY	GRAY

KEY TO COLOR CODE	
(R)	RED
(G)	GREEN
(B)	BLACK
(Y)	YELLOW
(W)	WHITE
(RB)	RED WITH BLACK TRACER
(BR)	BLACK WITH RED TRACER
(RY)	RED WITH YELLOW TRACER



LATE 1966
CIRCUIT BREAKER

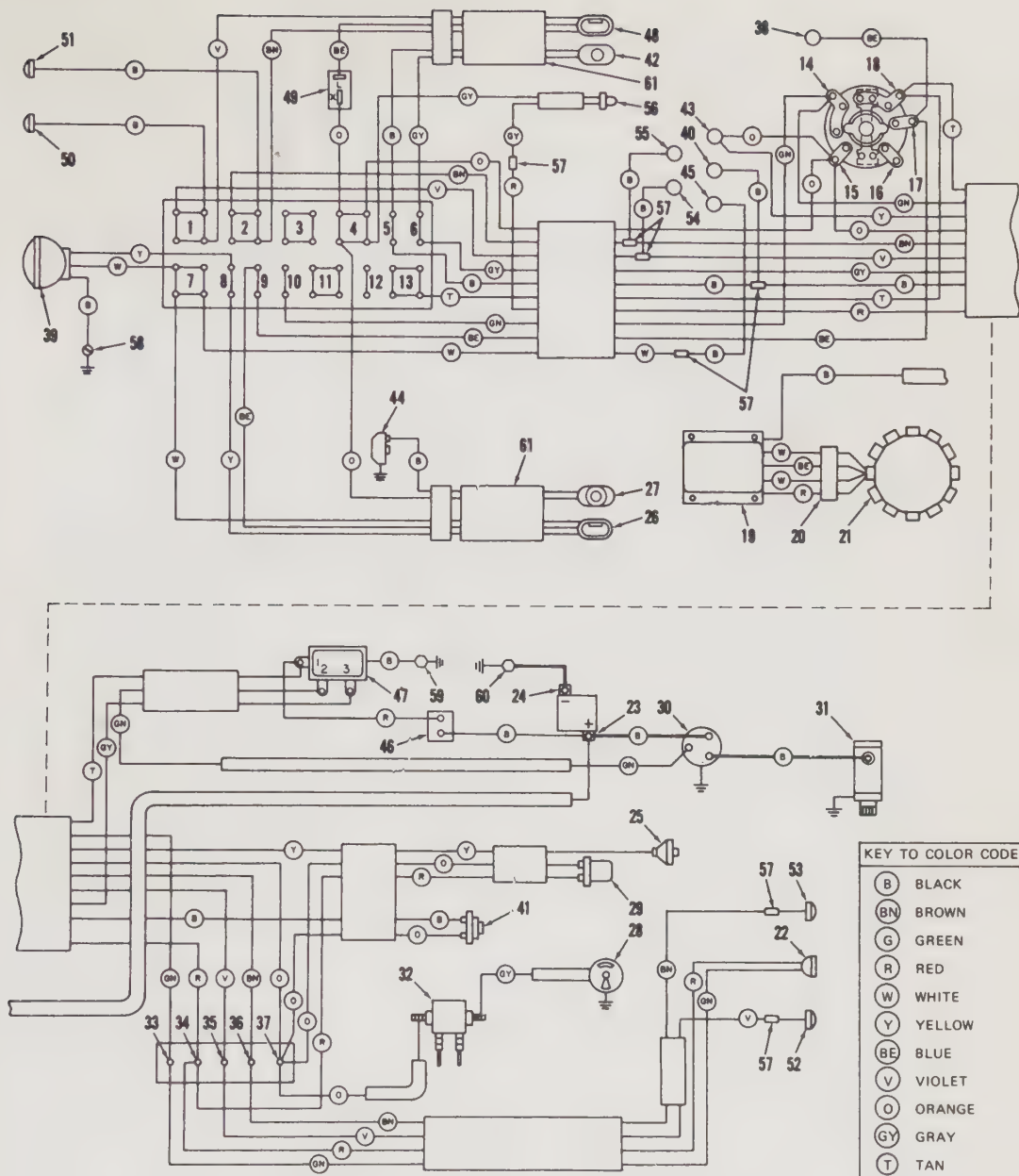
- 44. Speedometer light
- 45. Terminal plate top mounting screw (ground)
- 46. Headlamp
- 47. Neutral indicator light
- 48. Neutral switch
- 49. Starter button
- 50. Oil signal light
- 51. Horn
- 52. Circuit breaker



1965-67 Electra Glide

- 25. Terminal
- 26. Ignition circuit breaker
- 27. Stop lamp switch
- 28. Generator signal light
- 29. Terminal—Not used with standard wiring
- 30. Terminal—Not used with standard wiring
- 31. Terminal
- 32. Generator "F" terminal
- 33. Generator "A" terminal
- 34. Starter solenoid
- 35. Starter motor
- 36. Ignition coil
- 37. Terminal plate
- 38. Terminal box—See terminals 39 through 43
- 39. Terminal
- 40. Terminal
- 41. Terminal
- 42. Terminal
- 43. Terminal

- A. Conduit (four wire)—Red, green, black and yellow
- B. Conduit (one wire)—Green
- C. Conduit (four wire)—Red, green, yellow and black
- D. Left handlebar (loose wires)—red with black tracer, black with red tracer, red with yellow tracer, 2 black wires
- E. Right handlebar (loose wires)—2 Black wires
- F. Conduit (two wire)—2 Red wires
- G. Conduit (one wire)—Yellow
- H. Conduit (three wire)—Black, white and yellow
- J. Conduit (two wire)—Red and green
- K. Conduit (one wire)—Red
- L. Conduit (two wire)—Green and red
- M. Conduit (one wire)—Black
- N. Conduit (one wire)—Black
- O. Conduit (one wire)—Black
- P. Conduit (two wire)—2 Black wires
- Q. Conduit (one wire)—Red
- 1. Switch terminal—Switch supply
- 2. Switch terminal—Headlamp
- 3. Switch terminal—Not used with standard wiring
- 4. Switch terminal—Tail lamp
- 5. Switch terminal—Ignition coil
- 6. Ignition—Light switch—See terminals 1 through 5
- 7. Junction terminal
- 8. Junction terminal
- 9. Terminal
- 10. Terminal
- 11. Terminal—Not used with standard wiring
- 12. Terminal—Not used with standard wiring
- 13. Regulator
- 14. Tail and stop lamp

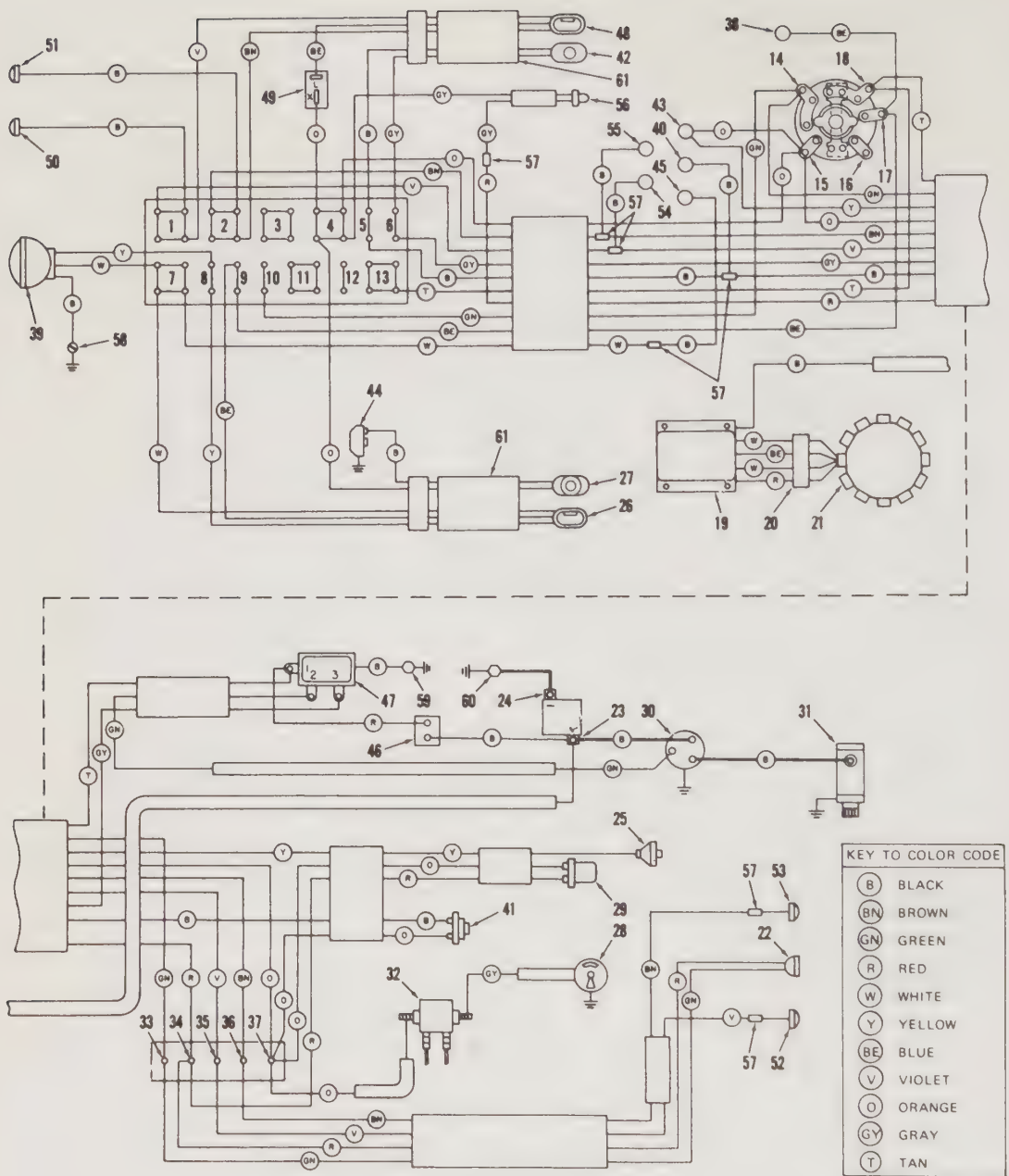


1970 Electra Glide

- | | | |
|---|---|---------------------------------------|
| 1. to 13. Front terminal board terminals | 28. Ignition circuit breaker | 45. High beam indicator lamp |
| 14. Switch tail lamp terminal | 29. Stop lamp switch—rear | 46. Overload circuit breaker |
| 15. Switch ignition terminal | 30. Starter solenoid | 47. Starter relay |
| 16. Switch terminal (not used with standard wiring) | 31. Starter motor | 48. Direction signal switch |
| 17. Switch headlamp terminal | 32. Ignition coil | 49. Direction signal flasher |
| 18. Switch supply terminal | 33. Rear terminal board terminal—top | 50. Left front direction lamp |
| 19. Regulator-rectifier module | 34. Rear terminal board terminal | 51. Right front direction lamp |
| 20. Alternator to module connector plug | 35. Rear terminal board terminal | 52. Left rear direction lamp |
| 21. Alternator stator | 37. Rear terminal board terminal—bottom | 53. Right rear direction lamp |
| 22. Tail and stop lamp | 38. Speedometer light | 54. Left direction signal pilot lamp |
| 23. Battery positive terminal | 39. Headlamp | 55. Right direction signal pilot lamp |
| 24. Battery negative terminal | 40. Neutral indicator light | 56. Stop lamp switch—front |
| 25. Oil pressure signal switch | 41. Neutral switch | 57. Connector |
| 26. Handlebar headlamp switch | 42. Starter button | 58. Terminal board mounting screw |
| 27. Horn switch | 43. Oil signal light | 59. Transmission stud |
| | 44. Horn | 60. Frame lug bolt |
| | | 61. Handlebar |

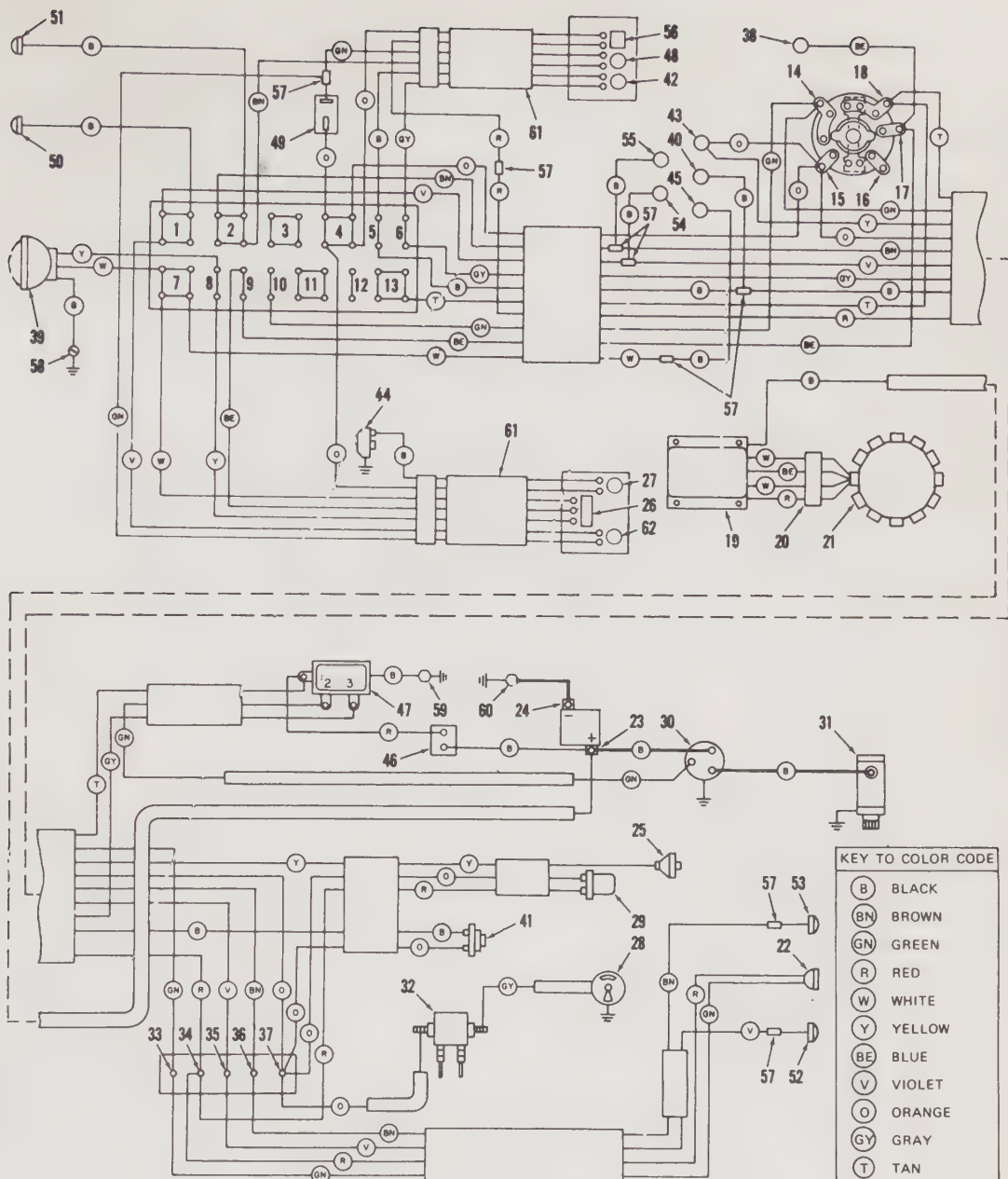


- A. Conduit (four wire)—Red, green, black and yellow
- B. Conduit (one wire)—Green
- C. Conduit (four wire)—Red, green, yellow and black
- D. Left handlebar (loose wires)—Red with black tracer, black with red tracer, red with yellow tracer, 2 black wires
- E. Right handlebar (loose wires)—Red, green, brown, 2 black wires
- F. Conduit (one wire)—Red
- G. Conduit (one wire)—Yellow
- H. Conduit (three wire)—Black, white and yellow
- J. Conduit (two wires)—Red and green
- K. Conduit (one wire)—Red
- L. Conduit (two wire)—Green and red
- M. Conduit (one wire)—Black
- N. Conduit (one wire)—Black
- O. Conduit (one wire)—Black
- P. Conduit (two wire)—2 Black wires
- Q. Conduit (one wire)—Red
- R. Conduit (one wire)—Red
- S. Conduit (one wire)—Green
- T. Conduit (two wire)—Red and green
- 1. Switch terminal—Switch supply
- 2. Switch terminal—Headlamp
- 3. Switch terminal—Not used with standard wiring
- 4. Switch terminal—Tail lamp
- 5. Switch terminal—Ignition coil
- 6. Ignition—Light switch—See terminals 1 through 5
- 7. Junction terminal
- 8. Junction terminal
- 9. Terminal
- 10. Terminal
- 11. Terminal
- 12. Terminal—Not used with standard wiring
- 13. Regulator
- 14. Tail and stop lamp
- 15. Battery positive terminal
- 16. Battery negative terminal
- 17. Oil pressure signal switch
- 19. Horn switch
- 20. Terminal—Not used with standard wiring
- 21. Terminal
- 22. Terminal
- 23. Terminal
- 24. Terminal
- 25. Terminal
- 26. Ignition circuit breaker
- 27. Stop lamp switch
- 28. Generator signal light
- 29. Terminal—Not used with standard wiring
- 30. Terminal—Not used with standard wiring
- 31. Terminal
- 32. Generator "F" terminal
- 33. Generator "A" terminal
- 34. Starter solenoid
- 35. Starter motor
- 36. Ignition coil
- 37. Terminal plate
- 38. Terminal box—See terminals 39 through 43
- 39. Terminal
- 40. Terminal
- 41. Terminal
- 42. Terminal
- 43. Terminal
- 44. Speedometer light
- 45. Terminal plate top mounting screw (ground)
- 46. Headlamp
- 47. Neutral indicator light
- 48. Neutral switch
- 49. Starter button
- 50. Oil signal light
- 51. Horn
- 52. High beam indicator lamp
- 53. Overload circuit breaker
- 54. Starter relay
- 55. Direction signal switch
- 56. Direction signal flasher
- 57. Left front direction lamp
- 58. Right front direction lamp
- 59. Left rear direction lamp
- 60. Right rear direction lamp
- 61. Left direction signal pilot lamp
- 62. Right direction signal pilot lamp
- 63. Stop lamp front switch
- 64. Connector



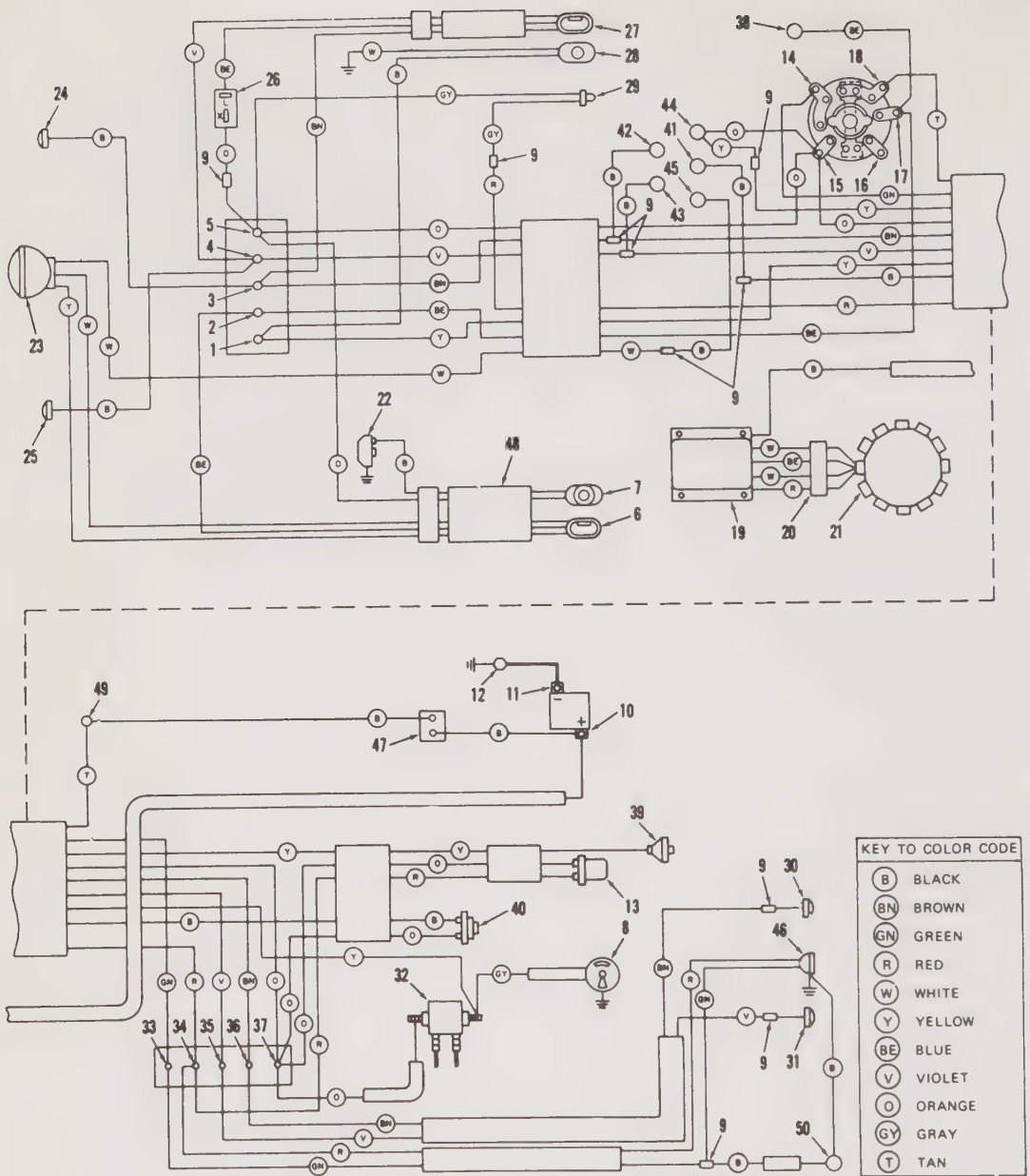
1971 Electra Glide

- | | | |
|---|---|---------------------------------------|
| 1. to 13. Front terminal board terminals | 28. Ignition circuit breaker | 45. High beam indicator lamp |
| 14. Switch tail lamp terminal | 29. Stop lamp switch—rear | 46. Overload circuit breaker |
| 15. Switch ignition terminal | 30. Starter solenoid | 47. Starter relay |
| 16. Switch terminal (not used with standard wiring) | 31. Starter motor | 48. Direction signal flasher |
| 17. Switch headlamp terminal | 32. Ignition coil | 49. Direction signal flasher |
| 18. Switch supply terminal | 33. Rear terminal board terminal top | 50. Left front direction lamp |
| 19. Regulator-rectifier module | 34. Rear terminal board terminal | 51. Right front direction lamp |
| 20. Alternator to module connector plug | 35. Rear terminal board terminal | 52. Left rear direction lamp |
| 21. Alternator stator | 36. Rear terminal board terminal | 53. Right rear direction lamp |
| 22. Tail and stop lamp | 37. Rear terminal board terminal—bottom | 54. Left direction signal pilot lamp |
| 23. Battery positive terminal | 38. Speedometer light | 55. Right direction signal pilot lamp |
| 24. Battery negative terminal | 39. Headlamp | 56. Stop lamp switch—front |
| 25. Oil pressure signal switch | 40. Neutral indicator light | 57. Connector |
| 26. Handlebar headlamp switch | 41. Neutral switch | 58. Terminal board mounting screw |
| 27. Horn switch | 42. Starter button | 59. Transmission stud |
| | 43. Oil signal light | 60. Frame lug bolt |
| | 44. Horn | 61. Handlebar |



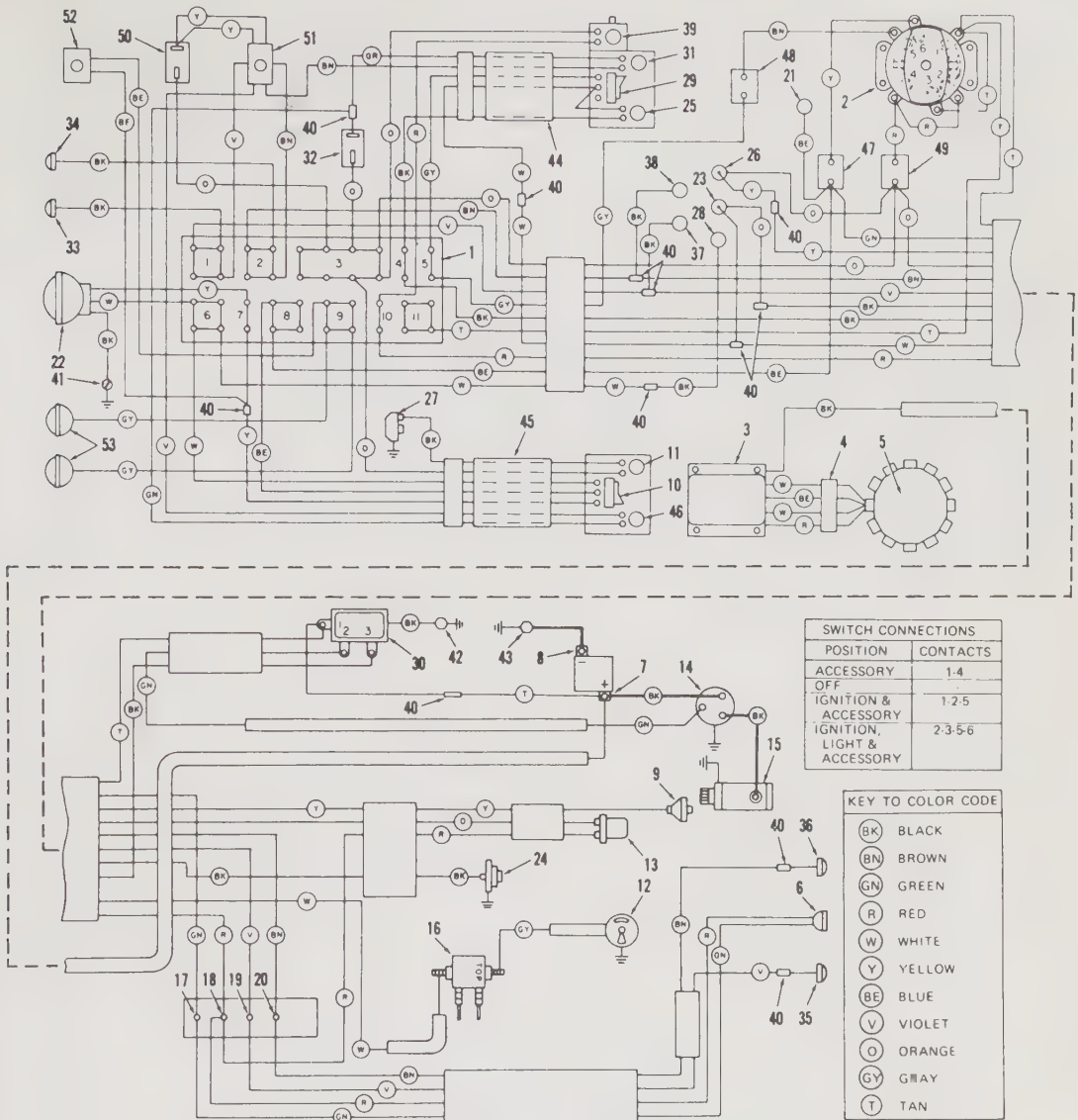
1972 Electra Glide

- | | | |
|---|---|---------------------------------------|
| 1. to 13. Front terminal board terminals | 28. Ignition circuit breaker | 45. High beam indicator lamp |
| 14. Switch tail lamp terminal | 29. Stop lamp switch—rear | 46. Overload circuit breaker |
| 15. Switch ignition terminal | 30. Starter solenoid | 47. Starter relay |
| 16. Switch terminal (not used with standard wiring) | 31. Starter motor | 48. Direction signal switch |
| 17. Switch headlamp terminal | 32. Ignition coil | 49. Direction signal flasher |
| 18. Switch supply terminal | 33. Rear terminal board terminal—top | 50. Left front direction lamp |
| 19. Regulator-rectifier module | 34. Rear terminal board terminal | 51. Right front direction lamp |
| 20. Alternator to module connector plug | 35. Rear terminal board terminal | 52. Left rear direction lamp |
| 21. Alternator stator | 37. Rear terminal board terminal—bottom | 53. Right rear direction lamp |
| 22. Tail and stop lamp | 38. Speedometer light | 54. Left direction signal pilot lamp |
| 23. Battery positive terminal | 39. Headlamp | 55. Right direction signal pilot lamp |
| 24. Battery negative terminal | 40. Neutral indicator light | 56. Stop lamp switch—front |
| 25. Oil pressure signal switch | 41. Neutral switch | 57. Connector |
| 26. Handlebar headlamp switch | 42. Starter button | 58. Terminal board mounting screw |
| 27. Horn switch | 43. Oil signal light | 59. Transmission stud |
| | 44. Horn | 60. Frame lug bolt |
| | | 61. Handlebar |
| | | 62. Left direction signal switch |



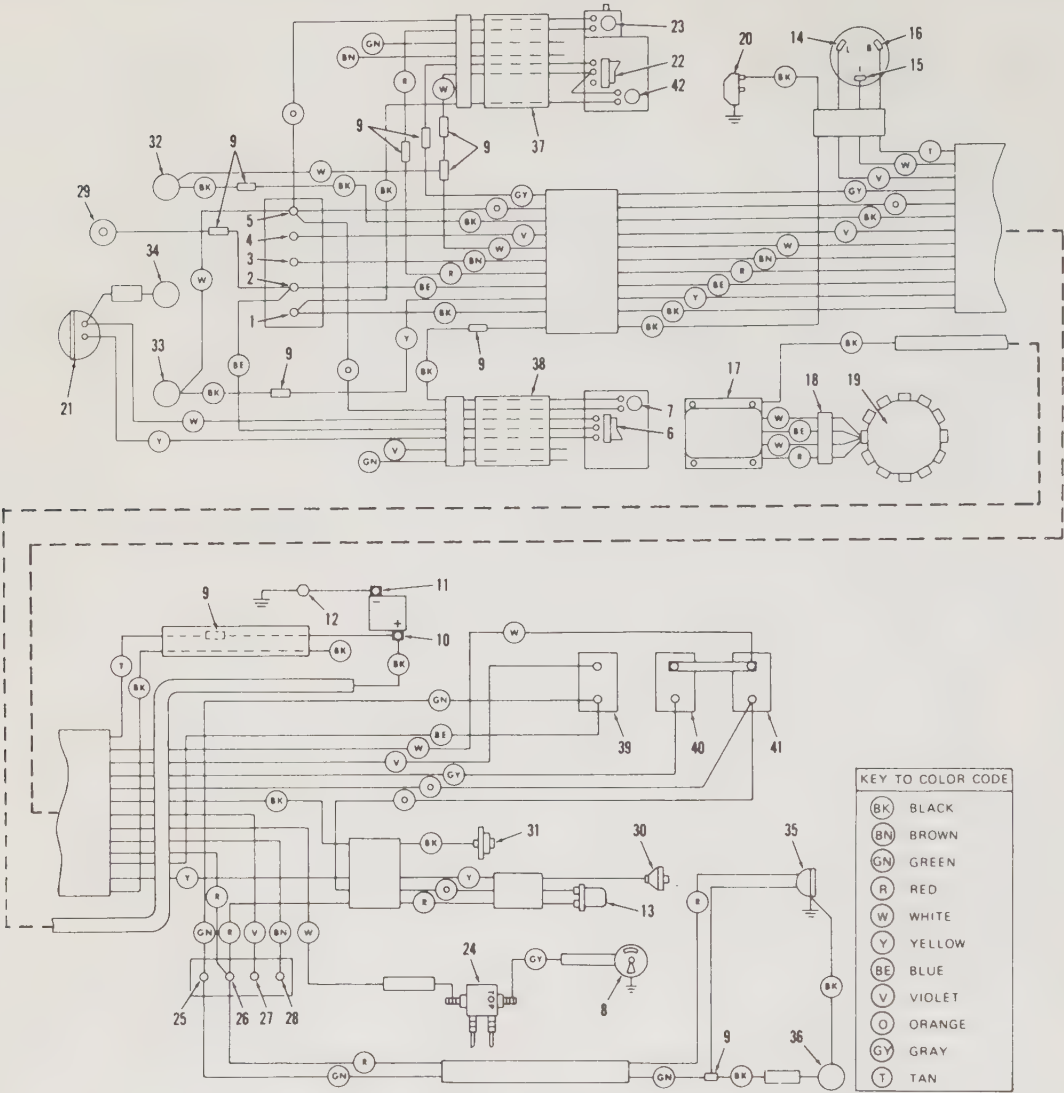
1971 and later Super Glide

- | | | |
|---|---|---|
| 1. to 5. Fork terminal board terminals | 20. Alternator to module connector plug | 35. Rear terminal board terminal |
| 6. Headlamp dimmer switch | 21. Alternator stator | 36. Rear terminal board terminal |
| 7. Horn switch | 22. Horn | 37. Rear terminal board terminal—bottom |
| 8. Ignition circuit breaker | 23. Headlamp | 38. Speedometer light |
| 9. Wire connector | 24. Right front direction lamp | 39. Oil pressure signal switch |
| 10. Battery positive terminal | 25. Left front direction lamp | 40. Neutral switch |
| 11. Battery negative terminal | 26. Direction signal flasher | 41. Neutral indicator light |
| 12. Frame lug bolt | 27. Direction signal switch | 42. Right direction signal pilot lamp |
| 13. Stop lamp switch—rear | 28. Ignition cutout button | 43. Left direction signal pilot lamp |
| 14. Switch tail lamp terminal | 29. Stop lamp switch—front | 44. Oil signal lamp |
| 15. Switch ignition terminal | 30. Right rear direction signal lamp | 45. High beam indicator lamp |
| 16. Switch terminal (not used with standard wiring) | 31. Left rear direction signal lamp | 46. Tail and stop lamp |
| 17. Switch headlamp terminal | 32. Ignition coil | 47. Overload circuit breaker |
| 18. Switch supply terminal | 33. Rear terminal board terminal—top | 48. Left handlebar |
| 19. Regulator—rectifier module | 34. Rear terminal board terminal | 49. Junction terminal |
| | | 50. License lamp |



1973 and later FL/FLH

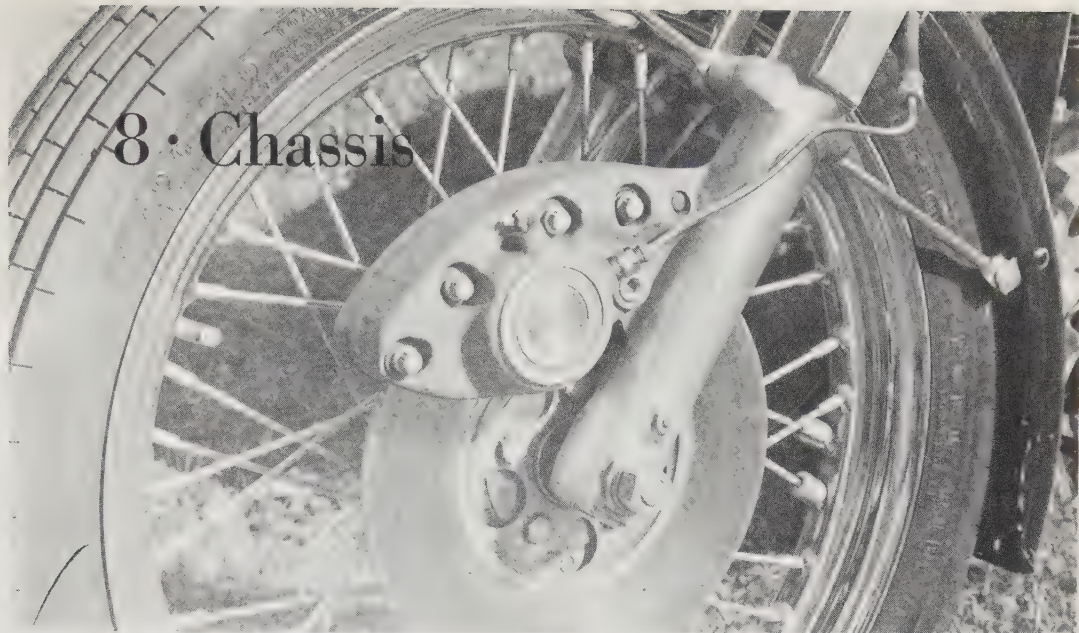
- | | | |
|---|---|---------------------------------------|
| 1. Front terminal board terminals (1 to 11) | 19. Rear terminal board terminal | 36. Right rear direction lamp |
| 2. Switch terminals (1 to 6) | 20. Rear terminal board terminal—bottom | 37. Left direction signal pilot lamp |
| 3. Regulator-rectifier module | 21. Speedometer light | 38. Right direction signal pilot lamp |
| 4. Alternator to module connector plug | 22. Headlamp | 39. Stop lamp switch—front |
| 5. Alternator stator | 23. Neutral indicator light | 40. Connector |
| 6. Tail and stop lamp | 24. Neutral switch | 41. Terminal board mounting screw |
| 7. Battery positive terminal | 25. Starter button | 42. Transmission stud |
| 8. Battery negative terminal | 26. Oil signal light | 43. Frame lug bolt |
| 9. Oil pressure signal switch | 27. Horn | 44. Right handlebar |
| 10. Headlamp beam switch | 28. High beam indicator lamp | 45. Left handlebar |
| 11. Horn switch | 29. Engine stop switch | 46. Left direction signal switch |
| 12. Ignition breaker (timer) | 30. Starter relay | 47. Lighting circuit breaker |
| 13. Stop lamp switch—rear | 31. Right direction signal switch | 48. Ignition circuit breaker |
| 14. Starter solenoid | 32. Direction signal flasher | 49. Accessories circuit breaker |
| 15. Starter motor | 33. Left front direction lamp | 50. Emergency flasher |
| 16. Ignition coil | 34. Right front direction lamp | 51. Emergency flasher switch |
| 17. Rear terminal board terminal—top | 35. Left rear direction lamp | 52. Passing lamp switch |
| 18. Rear terminal board terminal | | 53. Passing lamp |



1973 and later FX

- | | |
|---|---|
| 1. to 5. Fork terminal board terminals | 24. Ignition coil |
| 6. Headlamp beam switch | 25. Rear terminal board terminal—top |
| 7. Horn switch | 26. Rear terminal board terminal |
| 8. Ignition breaker (timer) | 27. Rear terminal board terminal |
| 9. Wire connector | 28. Rear terminal board terminal—bottom |
| 10. Battery positive terminal | 29. Speedometer light |
| 11. Battery negative terminal | 30. Oil pressure signal switch |
| 12. Frame lug bolt | 31. Neutral switch |
| 13. Stop lamp switch—rear | 32. Neutral indicator light |
| 14. Switch "L" lights terminal | 33. Oil signal lamp |
| 15. Switch "I" ignition terminal | 34. High beam indicator lamp |
| 16. Switch "B" battery terminal | 35. Tail and stop lamp |
| 17. Regulator—rectifier module | 36. License lamp |
| 18. Alternator to module connector plug | 37. Right handlebar |
| 19. Alternator stator | 38. Left handlebar |
| 20. Horn | 39. Lighting circuit breaker |
| 21. Headlamp | 40. Ignition circuit breaker |
| 22. Engine stop switch | 41. Accessories circuit breaker |
| 23. Stop lamp switch—front | 42. Switch |

8 • Chassis



Wheels

REMOVAL AND INSTALLATION

Front Wheel

GLIDE MODELS

1. Raise the front wheel off the ground and support the motorcycle in this position.

2. Remove the cotter pin (or clevis pin), axle nut, flat washer, bushings (if applicable), and socket screws. Loosen the slider capnuts (or pinch-bolts) and remove the axle.

3. Lift the wheel clear of the brake drum and remove it.

4. Assemble in the reverse order of disassembly.

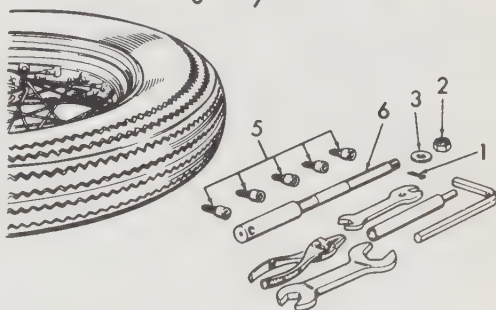
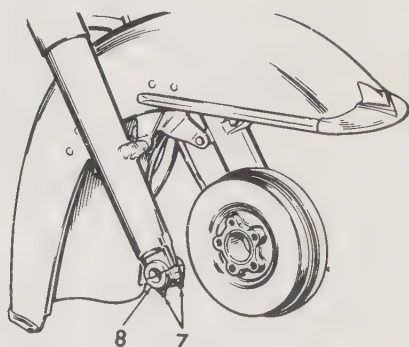
5. Thoroughly clean the brake linings and the brake drum.

6. Make sure that the disc slips between the caliper pads on disc brake models.

7. Secure the socket screws with a suitably sized allen wrench.

8. Secure the axle nut evenly, then the slider capnuts (or pinch-bolts), after the socket screws have been tightened, to attain proper alignment. Install a new cotter (or clevis) pin.

9. Adjust the brake as described in "Maintenance."



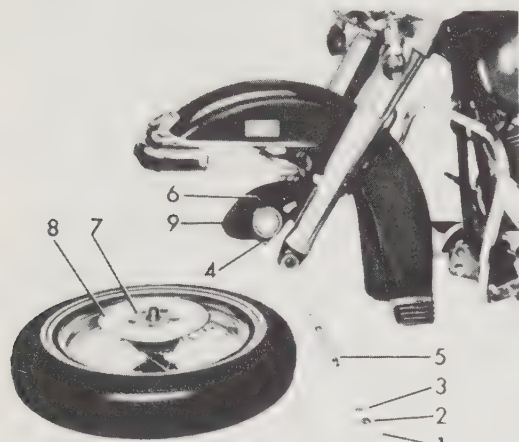
Front wheel assembly (Electra Glide)

- | | |
|----------------|---------------------------------|
| 1. Cotter pin | 5. Wheel mounting socket screws |
| 2. Axle nut | 6. Axle |
| 3. Flat washer | 7. Slider cap nuts |
| *4. Bushing | 8. Slider cap |

* Not used on Duo-Glide

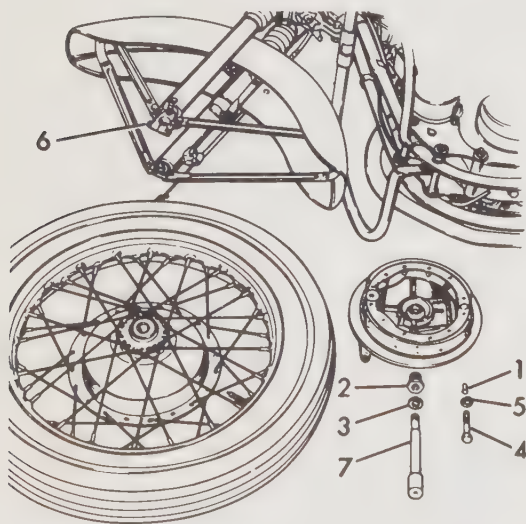
SPORTSTER AND SUPER GLIDE (DRUM BRAKE)

1. Raise the front wheel off the ground and support the motorcycle in this position.



1972 and later front wheel assembly (Glide models)

- | | |
|----------------|-------------------------------|
| 1. Cotter pin | 6. Bleed fitting |
| 2. Axle nut | 7. Brake disc mounting screws |
| 3. Flat washer | 8. Brake disc |
| 4. Cap nuts | 9. Brake caliper |
| 5. Axle | |



Front wheel assembly

- | | |
|------------------------------------|--------------------------|
| 1. Brake clevis pin | 5. Lock washer |
| 2. Axle nut | 6. Front axle pinch bolt |
| 3. Axle nut lock washer | 7. Front wheel axle |
| 4. Brake anchor and centering bolt | |

2. Disconnect the brake cable.

3. Remove the axle nut, lockwasher, brake anchor, shoe centering bolt, and lockwasher, then loosen the axle pinch-bolt.

4. Tap the axle loose and remove it.

5. Remove the wheel and brake assembly.

6. Assemble in the reverse order of disassembly.

7. Adjust the brake as described in "Maintenance."

FX AND SPORTSTER (1973 AND LATER)

1. Raise the front wheel off the ground and support the motorcycle in this position.

2. Remove axle nut and axle nut lock washer. Loosen the slider capnuts. Using a soft hammer, tap the left end of the axle to loosen and start it out. Pull axle out of fork assembly.

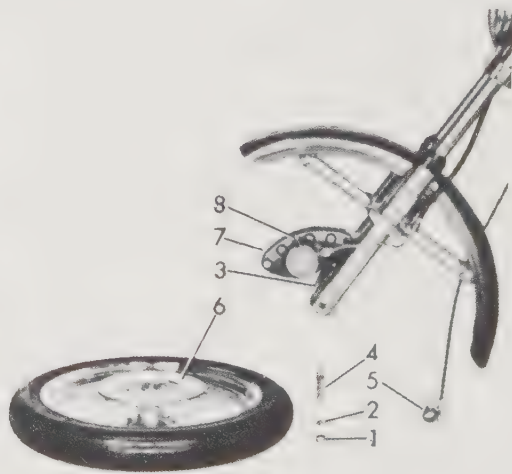
3. Remove the front wheel assembly and speedometer drive.

4. Reassemble in the reverse order of disassembly.

5. Align the brake pads during installation so that disc slips in properly.

6. Install speedometer drive. Be sure that drive ear engages hole in wheel hub.

7. Tighten axle nut to 50 ft lbs (maximum) and tighten the two slider capnuts. This ensures correct alignment of fork sliders.



Front wheel assembly (FX)

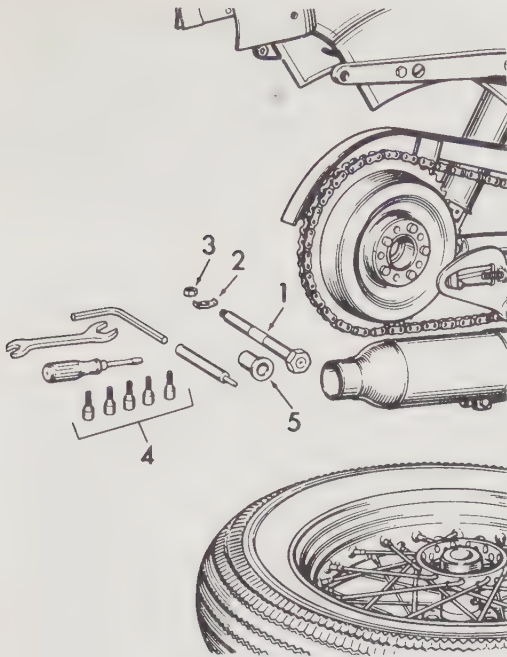
- | | |
|---------------|----------------------|
| 1. Axle nut | 5. Speedometer drive |
| 2. Lockwasher | 6. Brake disc |
| 3. Cap nuts | 7. Caliper |
| 4. Axle | 8. Bleed fitting |

Rear Wheel

GLIDE MODELS (DRUM BRAKE)

1. Raise the rear wheel off the ground and support the motorcycle in this position.

2. Remove the fender support screws and raise the fender flap (if applicable).



Glide models rear wheel assembly

- | | |
|------------------------|---------------------------------|
| 1. Axle | 4. Wheel mounting socket screws |
| 2. Axle nut lockwasher | 5. Spacer |
| 3. Axle nut | |

3. Remove the rear wheel mounting screws with a suitably sized allen wrench.

4. Remove the axle nut, lockwasher, axle, and axle spacer.

NOTE: Remove the wheel while actuating the rear brake. Brake Pedal Locking Tool (H-D Part No. 45875-58) may be used but is not necessary.

5. Assemble in the reverse order of disassembly.

6. Drum and linings must be thoroughly cleaned.

7. Secure the wheel mounting screws tightly so that the wheel cannot work free.

8. Secure the axle nut.

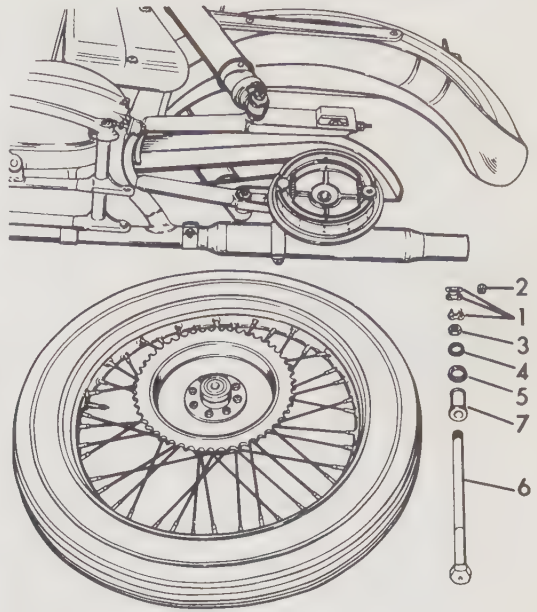
SPORTSTER (DRUM BRAKE)

1. Raise the rear wheel off the ground and support the motorcycle in this position.

2. Remove the drive chain master link and free the chain from the rear sprocket.

3. Remove the brake rod adjusting nut, axle nut, lockwasher, and centering collar, and then loosen the axle by tapping it on the axle nut side.

4. Remove the axle and axle spacer.



Sportster rear wheel assembly

- | | |
|---------------------------------|--------------------------------------|
| 1. Chain connecting link | 5. Axle centering collar, right side |
| 2. Rear brake rod adjusting nut | 6. Rear axle |
| 3. Axle nut | 7. Axle spacer, left side |
| 4. Axle nut lockwasher | |

5. Pull the wheel to the rear end of the frame and lift it up and out to remove.

6. Assemble in the reverse order of disassembly.

7. Adjust the brake as described in "Maintenance."

DISC BRAKE MODELS (1973 AND LATER)

1. Raise rear end of motorcycle off the ground and support in this position.

2. Disconnect rear chain. Remove brake anchor nut and cotter pin. Loosen castle nut.

3. Remove axle nut, lockwasher, axle, and spacer which fit between swing arm and sprocket side of wheel hub. Axle centering spacer fits into rear axle slot in swing arm. Remove wheel assembly.

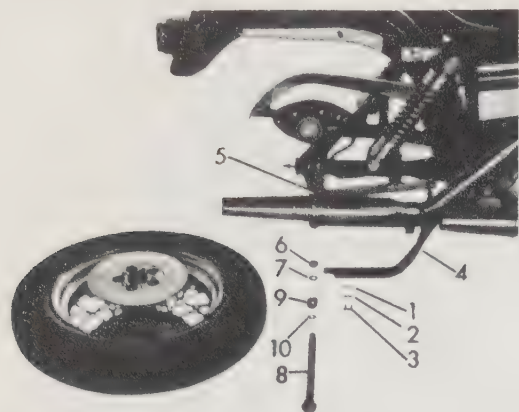
4. Assemble in the reverse order of disassembly.

5. Tighten axle nut to 50 ft lbs (maximum). Adjust rear chain as described in "Maintenance."

Sidecar Wheel

1. Raise the wheel off the ground and support the motorcycle in this position.

2. Loosen the fender front bracket and



Removing rear wheel (models with rear disc brake)

- | | |
|------------------------------------|----------------------|
| 1. Chain spring clip | 6. Axle nut |
| 2. Chain side plate | 7. Lock washer |
| 3. Chain connecting link | 8. Rear axle |
| 4. Drive chain | 9. Spacer |
| 5. Brake anchor nut and cotter pin | 10. Axle clip spacer |

step lug, and the fender inner brace clip bracket nut.

3. Remove the axle nut, lockwasher, and brace.

4. Tilt the fender forward, taking care to leave slack in the taillight wire.

5. Remove the extension nut, axle nut, washer, and wheel and drum assembly.

6. The wheel can be detached from the drum, if desired, by removing the wheel mounting screws with a suitably sized allen wrench.

7. Assemble in the reverse order of disassembly.

8. Take care to secure the socket screws tightly so that the wheel cannot work free.

Wheel Hub

GLIDE MODELS (FRONT AND REAR WHEELS)

Roller Bearing Wheel Hubs (1966 and Earlier)

DISASSEMBLY

1. Remove the wheels as described in "Wheel Removal and Installation."

2. Remove the thrust bearing cover screws, lockwashers, outer cover, cork grease retainer, bearing housing, housing gasket, bearing adjusting shims, outer thrust washer, bearing sleeve, and inner thrust washer.

3. Remove the bearing assembly and separate for reassembly.

4. Remove the roller retainer thrust washer.

5. Invert the hub and remove the outer roller retainer-spring locking, retaining washer, hub inner sleeve, cork grease retainer, inner spring locking, and roller bearing washer.

6. Remove the rollers, retainer, and thrust washer, and separate them for reassembly.

INSPECTION

1. Clean all parts other than the cork grease retainers, if they are to be reused, in a suitable solvent and blow them dry.

2. Inspect all parts for wear and replace if necessary.

3. Eliminate excessive bearing side-play by adding 0.002 in. adjusting shims until 0.005–0.007 in. clearance is obtained between the thrust bearing sleeve and the thrust bearing outer cover. This measurement must be taken without the cork retainer present.

NOTE: Bearing assemblies must be replaced as sets.

4. Fit bearings to eliminate radial play by installing oversize bearing rollers until a clearance of 0.001–0.005 in. is obtained. Rollers are available in 0.0002 in. gradations from 0.001 in. undersize to 0.001 oversize.

5. Replace the snap-rings and cork retainers.

ASSEMBLY

1. Assemble in the reverse order of disassembly.

2. Install a washer under the thrust bearing housing grease fitting.

3. Lightly grease the rollers, races, and thrust washers, and inject 1 oz of grease into the hub when it is assembled. Do not overlubricate the hub, since excess grease may get in the brakes.

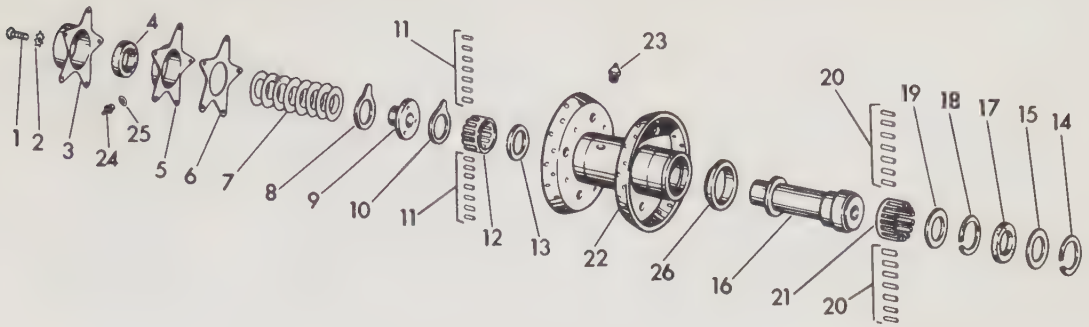
4. Check bearings for slight play and free-motion.

Ball Bearing Wheel Hubs (1967 and Later)

DISASSEMBLY

1. Remove the wheels as described in "Wheel Removal and Installation."

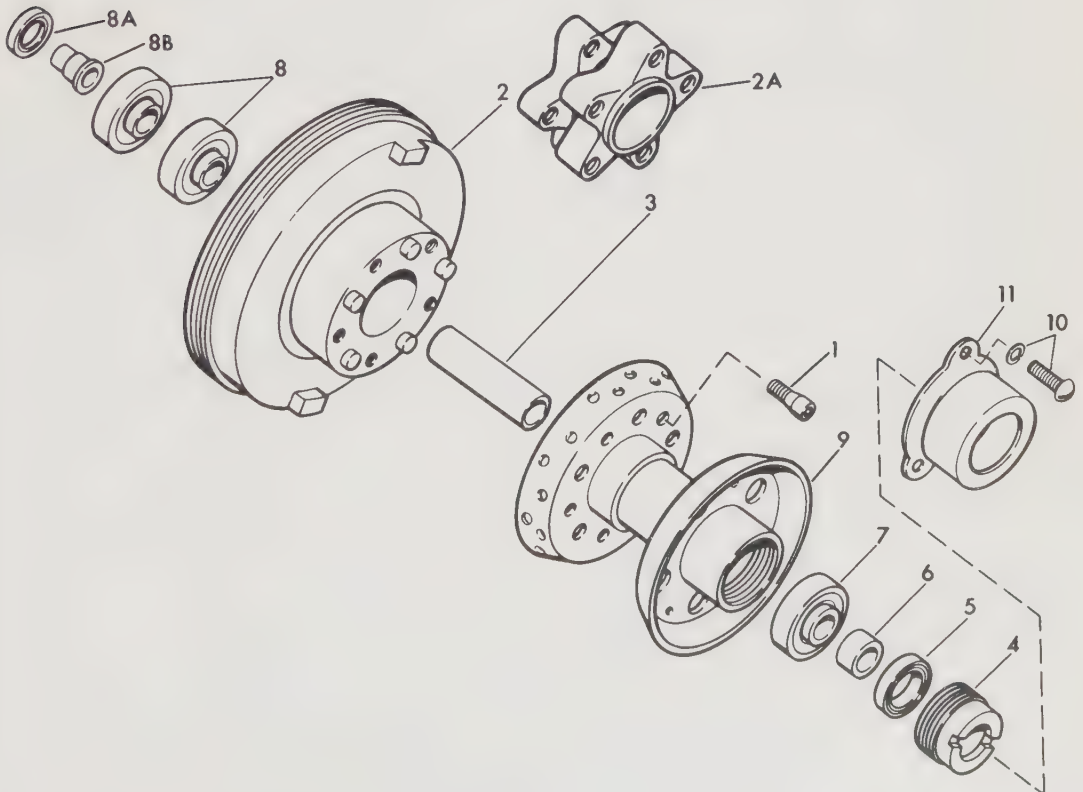
2. Remove the wheel mounting socket



Wheel hub assembly

- | | | |
|--|---|---|
| 1. Thrust bearing cover screw (5) | 9. Thrust bearing sleeve | 18. Roller bearing spring lock ring (see item 14) |
| 2. Thrust bearing cover screw lock-washer (5) | 10. Thrust washer (see item 8) | 19. Roller bearing washer |
| 3. Thrust bearing outer cover | 11. Bearing roller (12) | 20. Bearing roller (14) |
| 4. Cork grease retainer | 12. Roller retainer | 21. Roller retainer |
| 5. Thrust bearing housing | 13. Roller retainer thrust washer | 22. Hub shell |
| 6. Thrust bearing housing gasket | 14. Roller bearing spring lock ring (2) (see item 18) | 23. Grease fitting (2) |
| 7. Thrust bearing adjusting shim (varies) (each 0.002 in. thick) | 15. Retaining washer | 24. Grease fitting (see item 23) |
| 8. Thrust washer (2) (see item 10) | 16. Hub inner sleeve | 25. Plain washer |
| | 17. Cork grease retainer | 26. Roller retainer thrust collar |

Figure following name of part indicates quantity necessary for one complete assembly.



Wheel hub assembly

- | | | |
|--------------------------------------|------------------------------------|--------------------------------|
| 1. Wheel mounting socket screw (5) | 5. Seal | 8B. Spacer (1972 & later) |
| 2. Brake drum (front shown) | 6. Spacer | 9. Wheel hub |
| 2A. Brake disc flange (1972 & later) | 7. Ball bearing | 10. Bearing retainer screw (2) |
| 3. Bearing spacer | 8. Ball bearing (1 front) (2 rear) | 11. Bearing lock nut retainer |
| 4. Bearing lock nut | 8A. Oil seal (1972 & later) | |

screws with a suitably sized allen wrench.

3. Remove the brake drum (or brake disc flange) from the hub.

4. Remove the bearing spacer and press the drum bearing, or bearings, free from the hub side with a suitably sized drift.

5. Remove the retainer screws and retainer (late 1970 and later).

6. Remove the left-hand threaded bearing locknut with special tool (H-D Part No. 94630-67) or a suitable substitute, and remove the seal and spacer.

7. Press the hub bearing free with a suitable drift from the drum side.

INSPECTION

1. Check bearing for wear, rough motion, and excessive looseness of the inner and outer races and replace as necessary.

2. Inspect all of the parts for wear or damage, and replace as necessary.

3. Replace the seal if it is worn, cracked, or damaged, taking special note of the condition of the lip.

ASSEMBLY

1. Assemble in the reverse order of disassembly.

2. Pack both sides of the bearings and fill the remaining area in the hub and on the inside bearing of the drum with grease.

3. The drum and hub clamping faces must be completely clean so the wheel cannot work free.

SPORTSTER AND SUPER GLIDE FRONT WHEEL HUB

Disassembly

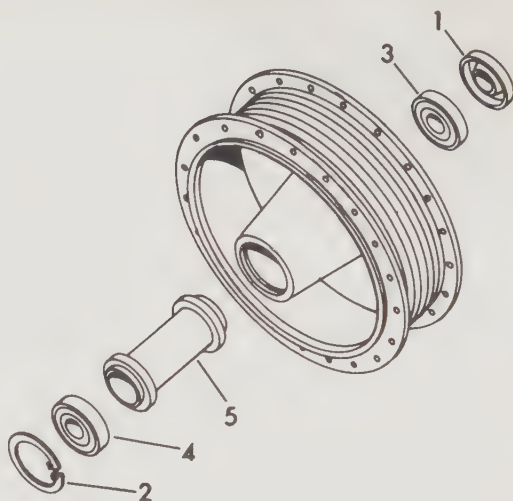
1. Remove the wheel as described in the wheels section "Removal and Installation."

2. Pry the grease retainer free with a pointed instrument.

3. Remove the retaining ring with snapping pliers.

4. Gently tap the grease retainer side ball bearing into its seat in the hub. This will cause the spacer to push the other bearing out slightly. Slide the spacer back to the seated bearing.

5. Insert an appropriate sized drift through the seated bearing and drift the opposite bearing out.



Wheel hub assembly

- | | |
|--------------------|------------------------------|
| 1. Grease retainer | 4. Ball bearing (brake side) |
| 2. Retaining ring | 5. Bearing spacer |
| 3. Ball bearing | |

6. Remove the spacer and drift the seated bearing out from the opposite end.

SPORTSTER REAR WHEEL HUB

Disassembly

1. Remove the wheel as described in the "Removal and Installation" section.

2. Remove the bearing locknut with the special tool (H-D Part No. 94630-67) or a suitable substitute. It will be necessary to break the stakings.

3. Drift the bearing oil seal and the outer spacer free from the opposite side of the hub with a suitable drift.

4. Drift the ball bearing and washer free in the above manner.

5. Remove the bearing spacer.

6. Drift the ball bearing, spacer (or spacer washer), and grease retainer as in the above manner.

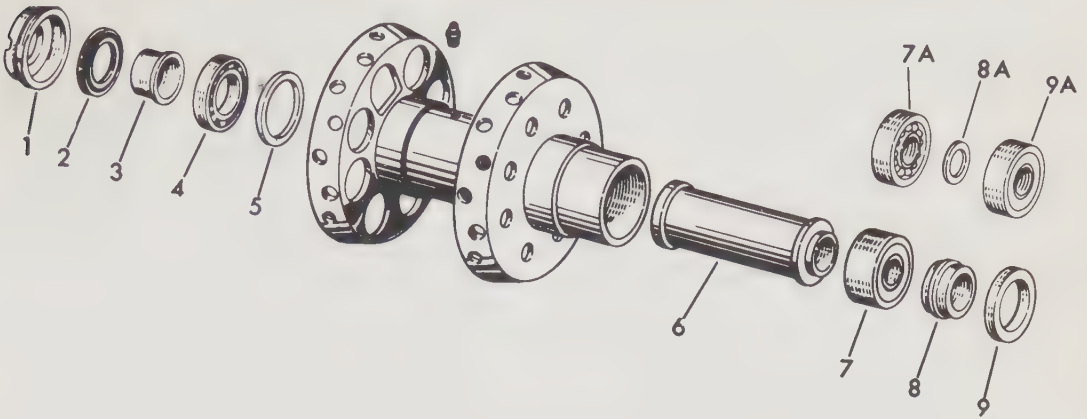
REAR WHEEL HUBS (ALL ABOVE MODELS)

Inspection

1. Clean all parts in a suitable solvent and blow them dry.

2. Inspect all parts for wear and replace as necessary.

3. Replace any bearings which are worn, damaged, scorched, or have excessive radial play or rough motion.



Wheel hub assembly

- | | | |
|-------------------------|-------------------|-----------------------------|
| 1. Bearing lock nut | 4. Ball bearing | 7A. Unshielded ball bearing |
| 2. Bearing oil seal | 5. Bearing washer | 8A. Bearing spacer washer |
| 3. Bearing outer spacer | 6. Bearing spacer | 9A. Shielded ball bearing |

4. Inspect the spoke flanges for damage or a bent condition and replace if necessary.

5. Clean and pack all ball bearings.

SPORTSTER AND SUPER GLIDE FRONT WHEEL HUB

Assembly

1. Press the retaining ring side bearing (shielded side out) against its seat in the hub.

2. Secure the retaining ring with snap-ring pliers.

3. Insert the bearing spacer, press the bearing against its seat in the hub, and secure the grease retainer.

SPORTSTER REAR WHEEL HUB

Assembly

1. Press the bearing oil seal into the locknut and the outer spacer into the oil seal.

2. Secure the bearing washer, bearing, and assembled locknut to the hub. Stake the locknut in two new places.

3. Insert the bearing spacer in the hub.

4. Press the ball bearing (or unshielded bearing) until it is seated against the bearing spacer.

5. Insert the bearing spacer (or bearing spacer washer) and the grease retainer (or shielded ball bearing).

DISC BRAKE MODELS

Front and Rear (Except FX and Sportster)

DISASSEMBLY AND ASSEMBLY

1. Remove wheel as described in "Wheel Removal and Installation."

2. Remove two lockrings. Remove washers, spacers, oil seal and bearing cones.

3. Remove bearing cups with a bearing puller. Remove spacer from hub.

4. Clean all parts in solvent. Inspect for worn or damaged parts, replace as necessary.

5. Reassemble in reverse order of disassembly.

6. Apply a liberal amount of bearing grease to all bearing cones before assembly.

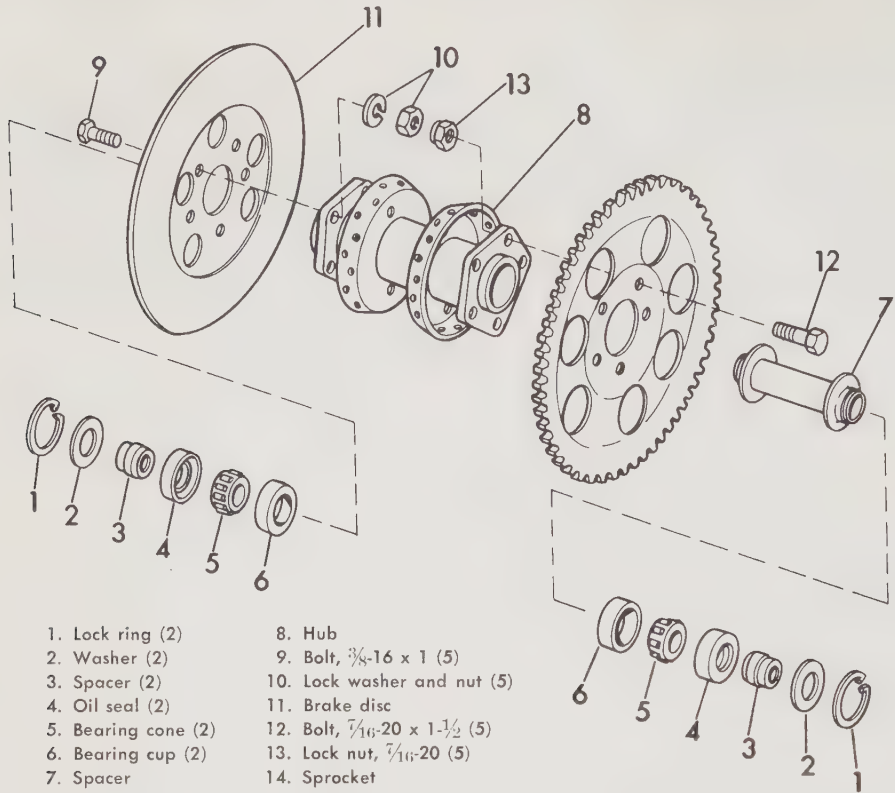
7. Press oil seal into hub. Lubricate lip of oil seal and install spacer. Bearing end-play should be 0.005 in. to 0.014 in. with an axial load of 100 lbs. applied to bearing cones. If end-play is incorrect, substitute a slightly longer or shorter spacer as necessary.

FX and Sportster Front Wheel Hub

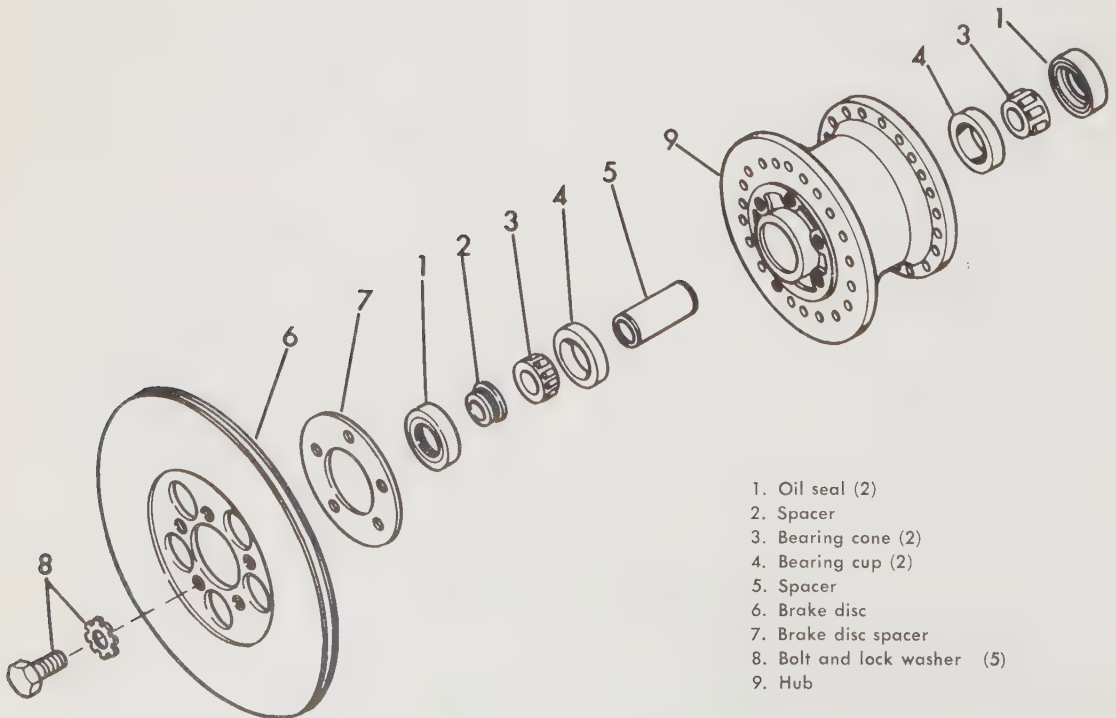
DISASSEMBLY AND ASSEMBLY

1. Remove wheel as directed in "Wheel Removal and Installation."

2. Remove oil seals, spacer, and bear-



FL/FLH interchangeable wheel, FX rear wheel (1973 and later)



FX front hub assembly (1973 and later)

ing cones. Remove bearing cups with a bearing puller. Remove spacer.

3. Remove brake disc and spacer only if they are to be replaced.

4. Clean and inspect all parts. Replace damaged or worn parts as necessary.

5. Reassemble in reverse order of disassembly.

6. Apply a liberal amount of bearing grease to all bearing cones before assembly.

7. Press oil seals into hub flush with outer surface. Lubricate lip of oil seal and install spacer. If brake disc and spacer were removed, inspect mating surfaces for flatness and reinstall. Tighten retaining bolts to 35 ft lbs.

8. Install wheel. Inspect bearing end-play, it should be between 0.005 to 0.013 in. If end-play is incorrect, substitute a slightly longer or shorter spacer as necessary.

Drive Chain

Removal and Installation

1. Loosen the axle housing frame clamps.

2. Loosen the axle adjusting screw locknuts and shift the axle forward about $\frac{1}{2}$ in.

3. Jack up the right wheel and spin it until either side of the master link is visible through the chainguard slot.

4. Loosely connect the chain links on either side of the master link with mechanic's wire to prevent the chain from running off the sprockets.

5. Remove the master link with Chain Tool (from tool kit—H-D Part No. 95020-38), Shop Tool (H-D Part No. 95021-29) or pry the spring clip from the link with a screwdriver.

6. Attach a new chain to the present chain, or an old chain if chain is to be cleaned, with the master link.

7. Rotate the wheel forward while feeding one chain off the sprockets and the other one on.

8. Attach the loose end of the replacement to the chainguard with a piece of mechanic's wire.

9. Remove the replaced chain and

connect the ends of the replacing chain. If a new chain is being mounted, secure it with a new master link, or at least use a new spring clip.

10. Secure the spring clip with Press Tool (H-D Part No. 95020-66) or pry on with a screwdriver.

11. If a second chain is not available, remove the chainguard and feed the chain off from the sprockets by rotating the rear wheel. Replace the chain by putting one end over the rear sprocket. With the transmission in First gear, crank the engine until the chain goes over mainshaft sprocket and secure it with the master link.

12. Adjust the chain as described in "Drive Chain Adjustment."

DETERMINING CHAIN WEAR

1. Lay the chain out on a flat surface.

2. Push the links together, a couple at a time, until all slack has been removed. Measure the overall length.

3. Pull on both ends until the chain is extended to its greatest possible length. Measure the chain again. If the overall length is greater by more than one inch, the chain is excessively worn and must be replaced.

4. This procedure can be used to measure the length of continuous-type primary chains also. Lay the chain on its side to do this and replace if the difference is greater than $\frac{3}{8}$ in.

Rear Wheel Sprocket

DRUM BRAKE MODELS

1. Remove the wheel as described in the "Replacement and Installation" section for the wheels.

2. Remove the brake drum from the wheel as described in the wheel hub section.

3. Free the sprocket from the drum by chiseling off the heads of all rivets and dowel pins from the brake shell side and then by punching them out.

4. If the rivet holes are not worn or elongated and if the drum is still in good condition, proceed as follows:

a. Using a new sprocket as a tem-

plate (guide), drill a new rivet hole from the brake shell side between the original dowel and the rivet holes. Use a No. 10 drill bit (0.1935 in. diameter) for the $\frac{3}{16}$ in. rivets. Sportster models require a $\frac{9}{16}$ in. hole.

b. Drill another hole opposite the first one and secure both with rivets but do not head them.

c. Drill the remaining holes and remove the sprocket.

d. Smooth the drum surface around the rivet holes.

6. Using the sprocket as a template, drill new $\frac{3}{16}$ in. dowel holes and smooth off any burrs which may have resulted.

7. Place the drum on the center support flange of Riveting Jig (H-D Part No. 95600-33B) and carefully align the sprocket on the drum. An appropriate riveting device may be substituted. Riveting Set (H-D Part No. 95612-42) or Rivet Punch (H-D Part No. 95613-42) may be purchased independently of the jig. If substitute rivets are used, make sure that they will provide a strong enough bond. Consult your dealer if you are in doubt.

8. Insert the dowel pins, then the rivets, from the brake shell side in the following manner:

a. Using a hollow driver, drive the sprocket and hub flange together by seating the dowel pins and rivets.

b. Work in opposite pairs to ensure an even seat between the sprocket and hub.

c. Flare the dowel pin and rivet ends with a punch until the heads extend $\frac{3}{64}$ in. above the sprocket surface for $\frac{5}{32}$ in. rivets. Rivet heads that are $\frac{3}{16}$ in. long must extend $\frac{3}{32}$ in. above the sprocket surface. Use a concave-end punch for the dowel pins and the smaller rivets, and a flat-end punch for the larger diameter rivets.

DISC BRAKE MODELS

1. Remove wheel as described in "Wheel Removal and Installation."

2. Remove the five bolts and locknuts from sprocket. Remove sprocket.

3. Install sprocket, make sure that mating surfaces are clean and flatness is checked. Tighten bolts to 35 ft lbs.

Truing Wheels

Truing should be done on a Wheel Truing Stand (H-D Part No. 95500-29A) but a substitute may be used. An axle and spacers may be substituted for Truing Arbor (H-D Part No. 95515-30A) and a dial indicator is more accurate than the fixed gauge on the factory stand.

Do not overtighten spokes as this may either cause the nipples to damage the rim or cause a spoke to break. Always secure the spokes firmly since loose spokes will loosen even more when stressed, causing the rim to go out of true.

1. Install the wheel in a stand so the hub will turn freely on the axle.

2. Turn each nipple until the spoke threads are just covered, using Spoke Nipple Wrench (H-D Part No. 94681-39) or any suitable substitute which will fit 0.234 in. nipples. A screwdriver may be used but only as a last resort.

3. Working from the valve hole, turn in each nipple three full turns. If the spokes are not taut, turn each nipple one more full turn.

4. Lay a straightedge across the hub and rims on both sides of the wheel to determine if the hub is centered. The object of the following steps is to bring both side measurements into agreement.

5. Slowly rotate the wheel and set the gauge to touch the rim at its highest point to correct sideways runout.

6. Loosen the gauge side nipples at their highest point and tighten the opposite nipples an equal amount.

7. Continue to perform the above procedure until the rim passes the gauge at equal distances all around.

8. Correct for excess distance between the rim and gauge by reversing the above procedure until a sideways run-out of $\frac{1}{32}$ in., or less, is attained.

9. Slowly rotate the wheel and set the gauge to correct for radial run-out.

10. Radial run-out is corrected by loosening the nipples at those points where the wheel does not ride on the gauge and then by tightening the opposite nipples where the rim does run on the gauge.

11. A correctly trued wheel will skim

over the gauge evenly with radial variations of $\frac{1}{32}$ in. or less.

12. Working from the valve hole, tighten the nipples one turn at a time each, all around the rim, until the spokes are normally taut. Repeatedly check the rim with a gauge.

13. Seat each spoke into the hub flange by punching them smartly with a flat nosed punch and hammer.

14. Smooth off the spoke ends at the rim with a file to prevent tube damage.

5. When installing the side slot cable ferrule in the brake lever, position the slot toward the inside, or down, on the earlier type, with the end slot.

6. Turn the adjusting sleeve clockwise to its stop.

7. Pull the cable from the lower end to remove all slack.

8. With the actuating lever in its lowest position, loop the cable around the clevis and secure it with a clevis clamp and clamp nut.

9. Replace the wheel and dust cover if applicable.

10. Adjust the brake cable.

Brakes

FRONT BRAKE CABLE REMOVAL AND INSTALLATION

1. Remove the wheel and the outer dust cover on Glide models.

2. Remove the clevis clamp nut and clamp.

3. Free the cable from the clevis and pull it free from the upper end of the cable housing (coil).

4. Slide a new cable in from the top of the cover, applying a light coat of grease as it goes in.

FRONT BRAKE (DRUM BRAKES)

Disassembly

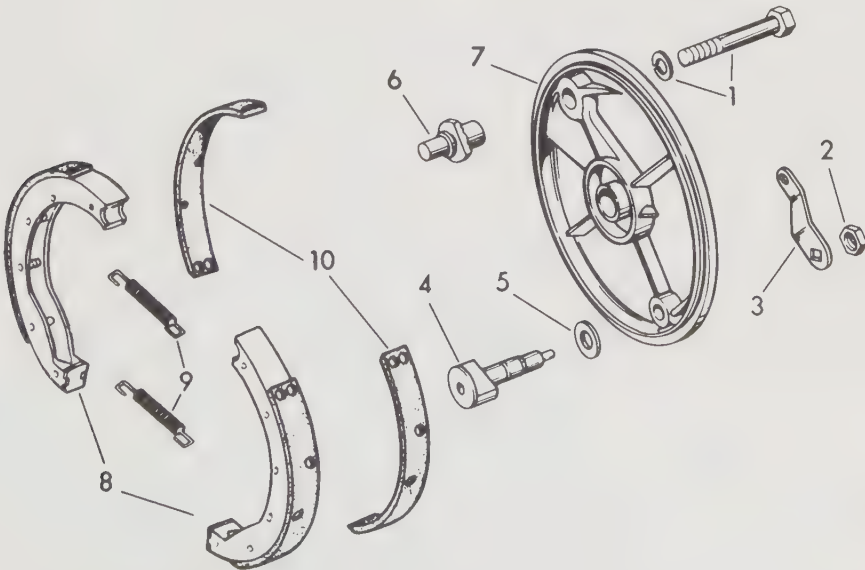
SPORTSTER AND SUPER GLIDE

1. Remove the wheel, with the brake drum, from the fork.

2. Remove the operating shaft nut and lever.

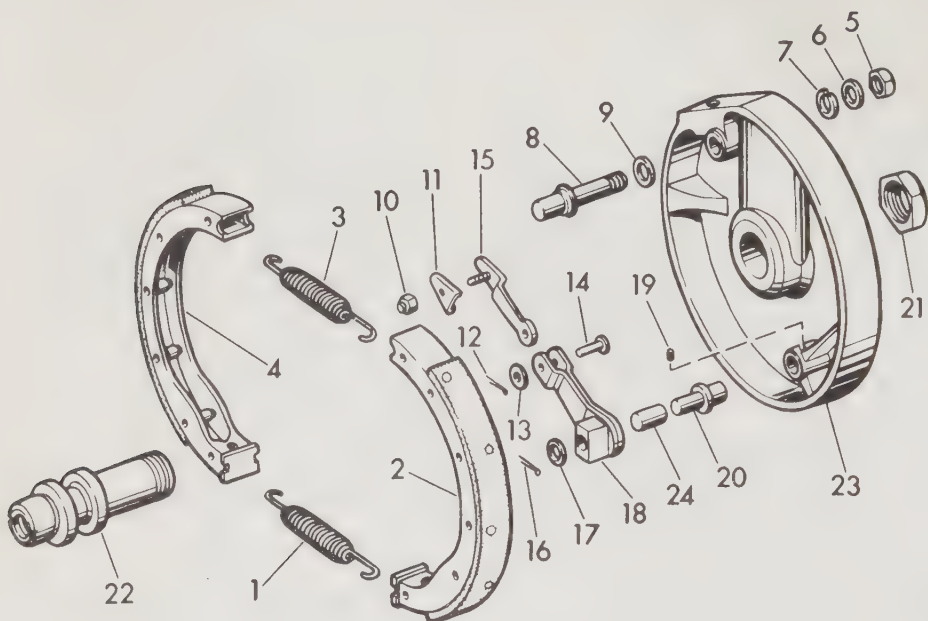
3. Remove, as a unit, the brake shoes, springs, operating shaft, washer, and pivot stud, by tapping with a soft mallet on the operating shaft.

4. Remove the shoes and springs from the pivot stud and operating shaft.



Front brake assembly (Sportster and Super Glide models)

- | | | |
|--------------------------------|---------------------------|------------------------------|
| 1. Pivot stud screw and washer | 5. Operating shaft washer | 8. Brake shoe and lining (2) |
| 2. Operating shaft nut | 6. Shoe pivot stud | 9. Brake shoe spring (2) |
| 3. Operating lever | 7. Brake side plate | 10. Brake lining (2) |
| 4. Operating shaft | | |



Front brake assembly (Glide models)

- | | | |
|---------------------------------------|--------------------------|-----------------------|
| 1. Brake shoe spring (2) | 9. Pivot stud washer | 17. Cam lever washer |
| 2. Brake shoe and lining (2) | 10. Clevis clamp nut | 18. Cam lever |
| 3. Brake shoe spring (see item 1) | 11. Cable clevis clamp | 19. Set screw |
| 4. Brake shoe and lining (see item 2) | 12. Cotter pin | 20. Cam lever stud |
| 5. Brake shoe pivot stud nut | 13. Flat washer | 21. Axle sleeve nut |
| 6. Pivot stud flat washer | 14. Cam lever clevis pin | 22. Front axle sleeve |
| 7. Pivot stud lock washer | 15. Cable clevis | 23. Brake side cover |
| 8. Pivot stud | 16. Cotter pin | 24. Cam lever bushing |

Figure following name of part indicates quantity necessary for one complete assembly.

GLIDE MODELS

1. Remove the wheel, with the brake drum, from the fork.
2. Remove the dust cover.
3. Remove the shoes and springs by lifting them out and away from the side-cover.
4. Remove the cotter pin, washer, cam lever, lever bushing, set screw, and cam lever stud.
5. Follow the numerical order as depicted in the accompanying illustration.

Inspection

(ALL MODELS)

1. Examine the brake shoes, lining, drum, cam pivot, and the cam for excessive wear, glazing, and embedded particles.
2. Exposed rivets on linings will gouge the drum and must be replaced. Oil-soaked, hard, cracked, or glazed linings must be replaced. Slightly worn lin-

ings can be dressed with medium grade sandpaper.

3. Replace the linings with rivets or replace them with ready-lined shoes. Always set the rivets from one end to the other to ensure a smooth, tight fit. Bevel the end of each brake lining.
4. Lightly lubricate the pivot stud (one squirt from a standard grease gun on Sportster grease fittings).
5. Rough up the drum braking surface with emery paper.

Assembly

1. Assemble in the reverse order of disassembly.
2. Assemble the brake shoes on the operating camshaft and pivot the stud with the top return spring in place in its groove nearest the brake side plate.
3. Assemble the shoes to the side plate, taking care to register the flat side of the pivot stud correctly in the flat side of the plate.

4. Secure the lower spring in place using a screwdriver as a lever or pliers.

5. Secure the operating nut and lever to the camshaft (Sportster models).

6. Mount the wheel and brake assemblies, adjust the cable, and center the shoes.

HYDRAULIC DISC BRAKES (FRONT AND REAR)

Bleeding

1. The brake must be bled anytime a line or cylinder is opened to remove all air.

2. Place a length of plastic tubing of appropriate size over the bleeder nipple and run the tube into a container with about one inch of brake fluid already in it so bubbles will be visible and so no air can get back in the system. Be sure there is no room for leakage around the nipple because brake fluid removes paint.

3. Open the bleeder nipple by rotating it counterclockwise about $\frac{1}{2}$ turn.

4. Keep the master cylinder full of fluid at all times to keep air out of the system.

5. Pump the foot pedal or hand lever repeatedly until no air bubbles come out of the plastic tube.

6. Fill the master cylinder to its original level.

7. Close the bleeder nipple first and then remove the plastic tube.

8. If bubbles keep coming, replace the master cylinder check valve.

9. Do not reuse brake fluid since it is hygrscopic (attracts moisture) and will become moisture-ridden from sitting in the draining container. This will cause spongy brake action.

Caliper

DISASSEMBLY AND INSPECTION

WARNING: *Hydraulic brake fluid will damage plastic, paint, and chrome surfaces.*

1. Free the hydraulic line from the hose clamp.

2. Remove the caliper bolts, washers, and outer caliper half.

3. Remove the mounting pin and inner caliper half.

4. Remove the brake pads and pad mounting pins.

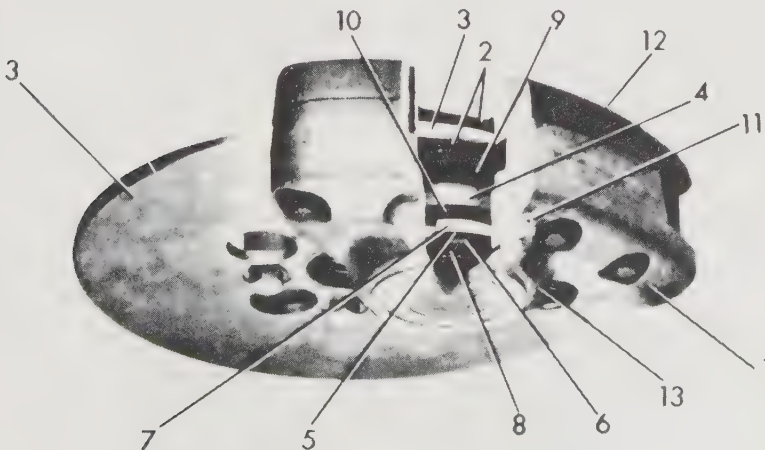
5. Inspect the brake pad friction material for excessive wear, damage, or a loose fit, and replace as a set if friction material is less than $\frac{1}{16}$ in. thick.

6. Inspect the friction material backing plates for damage or a warped condition and replace them if they are not completely flat.

7. Check the piston retraction with a dial indicator or spin the wheel and check it for drag. The piston should retract 0.020–0.025 in. when the hand lever is released.

8. Replace the piston if fluid leaks through the seal or if the piston does not retract. Replace in the following manner:

a. Pump the hand lever until the piston moves to the end of its travel.



1. Outer caliper half
2. Brake pad (2)
3. Brake disc
4. Piston
5. Wave spring
6. Backing plate
7. Adjusting ring
8. Retaining ring
9. Piston boot
10. O-ring
11. Bleeder valve
12. Inner caliper half
13. Hydraulic line port boss

Front disc brake

b. Disconnect the hydraulic line or drain the fluid into a clean glass container if the fluid is to be reused.

c. Slide the piston boot away from its groove in the piston and pull the piston free.

d. Remove the retaining ring with snap-ring pliers and slide out the backing plate, wave spring, adjusting ring, and O-ring.

9. Remove the bleeder valve.

10. Clean all of the metal parts in a suitable solvent and blow them dry.

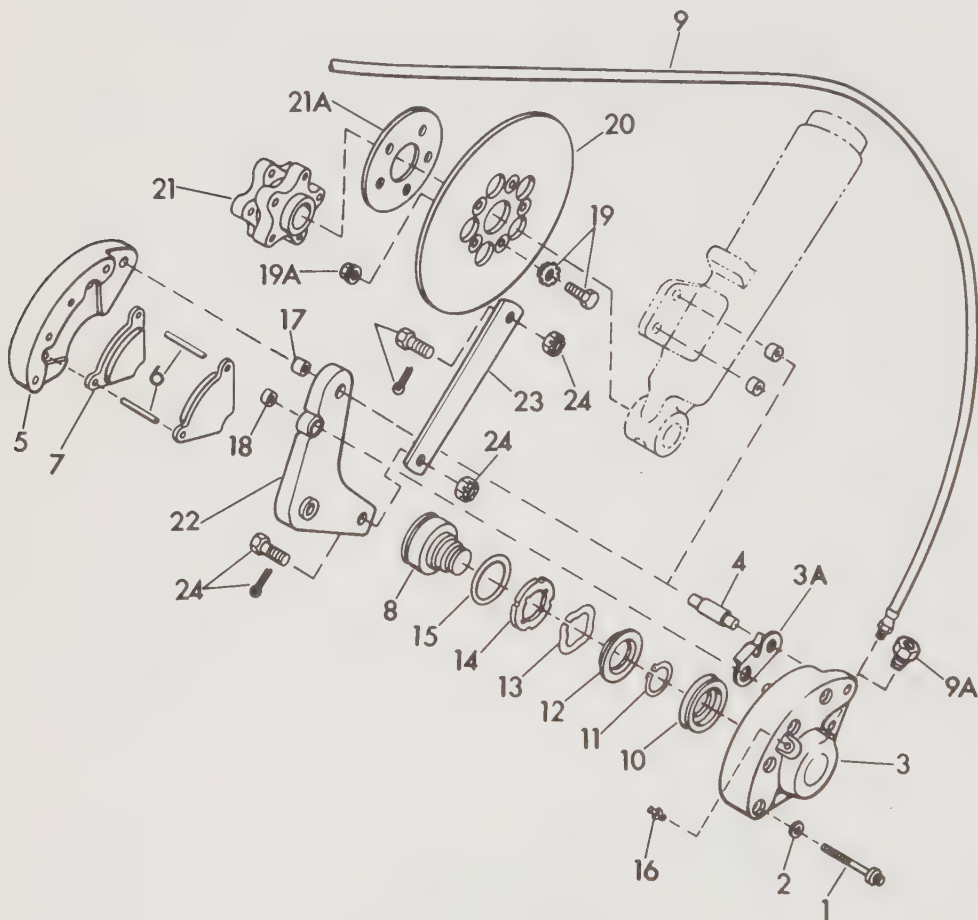
11. Replace any worn or damaged parts.

12. Replace the outer caliper half if the cylinder bore is scored or damaged.

13. Inspect the brake disc for scoring or warping and replace it if necessary. If the disc is less than $\frac{3}{16}$ in. thick, it must be replaced as described in "Brake Disc Removal and Installation."

14. Replace the bushings in the forks slider if they are worn or damaged.

15. Replace the O-ring, adjusting ring, and retaining ring.



Disc brake assembly (front and rear)

- | | | |
|--|--------------------------------|------------------------------------|
| 1. Bolt (4) | 10. Piston boot | 20. Brake disc |
| 2. Washer (4) | 11. Retaining ring | 21. Brake disc flange (1972) |
| 3. Outer caliper half | 12. Backing plate | 21A. Brake disc spacer |
| 3A. Damper spring (1973 & later) | 13. Wave spring | (1973 & later FX & Sportster) |
| 4. Mounting pin | 14. Adjusting ring | 22. Rear brake mounting bracket |
| 5. Inner caliper half | 15. O-ring | (1973 & later) |
| 6. Brake pad mounting pins (2) | 16. Bleeder valve | 23. Rear brake torque arm |
| 7. Brake pads (2) | 17. Bushing | (1973 & later) |
| 8. Brake piston | 18. Bushing | 24. Bolt, castle nut, & cotter pin |
| 9. Hydraulic line | 19. Bolt and lock washer (5) | (1973 & later) |
| 9A. Adapter (1973 & later
FX & Sportster) | 19A. Nut (5) (1973 & later FL) | |

ASSEMBLY

1. Assemble in reverse order of disassembly.

2. Immerse the piston, retaining ring, backing plate, wave spring, adjusting ring, piston boot, and O-ring in hydraulic fluid, and assemble in bore.

3. Assemble the piston boot in the caliper bore.

4. Press the piston into the assembled bore until it firmly seats, taking care to avoid scoring the bore.

5. Assemble the bleeder valve on the caliper.

6. Assemble the brake pads and calipers to the fork.

7. Apply a graphite compound to the caliper bolts and torque them to 35 ft lbs.

8. Assemble the hydraulic line, hose clamp, screw, and lockwasher.

9. With the bike standing straight up, fill the reservoir with hydraulic brake fluid to the gasket level.

10. Coat the fittings with a hydraulic sealant if leaks are present (Locktite® is recommended by the factory).

11. Bleed the system as described in "Bleeding Hydraulic System" until any spongy feeling disappears.

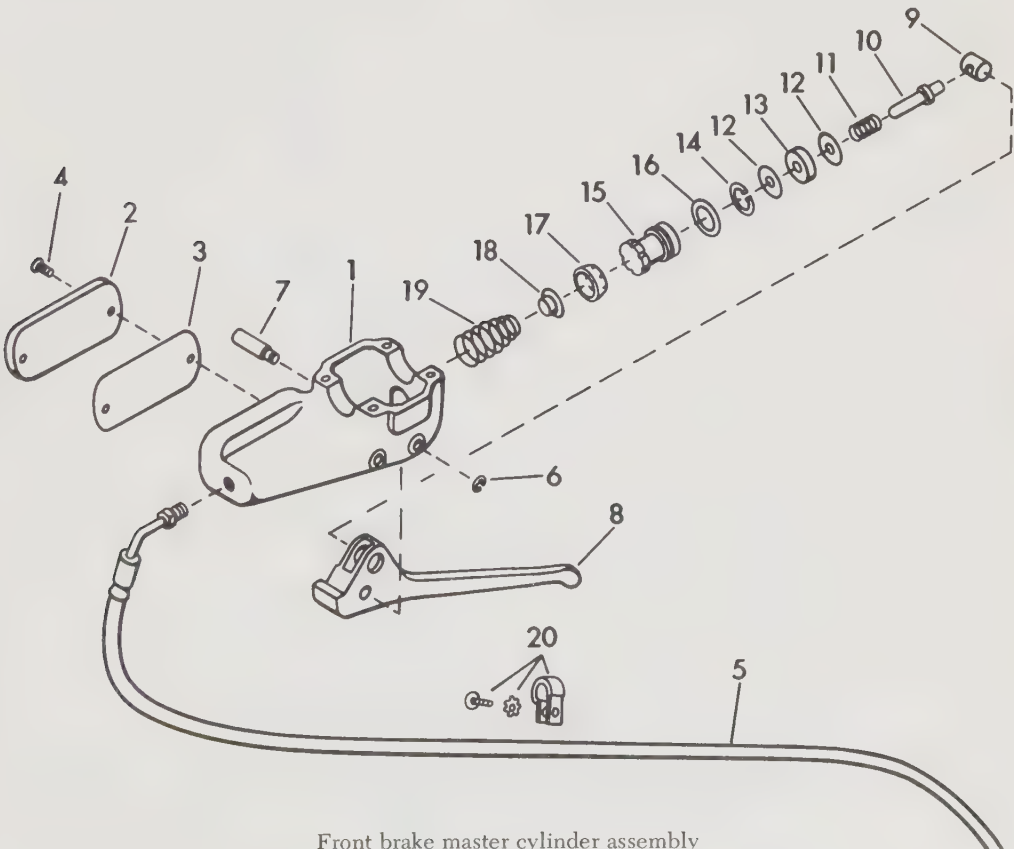
Brake Disc

REMOVAL AND INSTALLATION

1. Remove the wheel as described in the "Removal and Installation" section.

2. Remove the disc securing bolts and lockwashers.

3. Replace the disc if it is worn to 0.188 in., or less, or if it is warped more than $\frac{1}{32}$ in.



Front brake master cylinder assembly

- | | | |
|--------------------------|--------------------|--------------------------------------|
| 1. Master cylinder | 8. Brake lever | 15. Piston |
| 2. Master cylinder cover | 9. Pin | 16. O-ring |
| 3. Gasket | 10. Plunger | 17. Piston cup |
| 4. Screw (2) | 11. Spring | 18. Spring cup |
| 5. Hydraulic line | 12. Washer | 19. Spring |
| 6. Retaining ring | 13. Dust wiper | 20. Hose clamp, screw and lockwasher |
| 7. Pivot pin | 14. Retaining ring | |

4. Replace the brake disc flange if it is damaged.
5. Reassemble using new lockwashers and torque to 35 ft lbs.
6. Assemble the wheel on motorcycle.

Front Master Cylinder

DISASSEMBLY AND INSPECTION

1. Remove the cover securing screws, cover, and gasket.
2. Disconnect the hydraulic line at the caliper and drain it into a clean glass container if the fluid is to be reused.
3. Disconnect the stoplight wires and remove the handlebar switch assembly.
4. Remove the pivot pin, retaining ring, and pin.
5. Remove the lever, pin, plunger, spring, washers, dust wiper, and retaining ring.
6. Pull the piston, O-ring, piston cup, spring cup, and spring until they are free of the master cylinder.
7. Replace the piston cup and O-ring if they are worn, soft, or swollen.
8. Replace the cylinder walls if they are scratched or grooved.
9. Replace the gasket if it is leaky.
10. Blow the master cylinder vent hole clear.

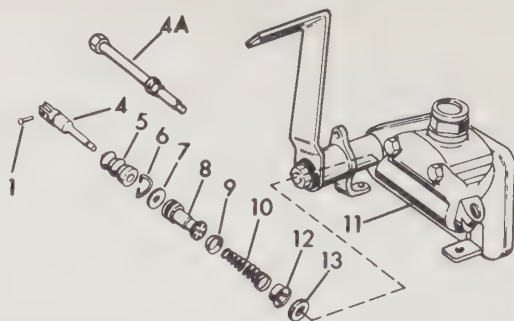
ASSEMBLY

1. Assemble in the reverse order of disassembly.
2. Use all components of the repair kit if such a kit is to be used.
3. Immerse all internal parts in hydraulic fluid before assembly.
4. Lightly grease the pivot pin and plunger pin before reassembly.
5. Check to see that the relief port in the master cylinder is open when the lever is released.
6. Fill the reservoir to the gasket level with brake fluid.
7. Bleed the system as described in "Bleeding Hydraulic Brake System."
8. Install the gasket with the flat side down and secure the cover.

Rear Master Cylinder

DISASSEMBLY

1. Drain the master cylinder of all brake fluid.
2. It is not necessary to remove the



Rear master cylinder assembly (drum and disc brake models)

1. Rod clevis pin
2. Washer
3. Cotter pin
4. Master cylinder plunger
- 4A. Master cylinder plunger (FX & Sportster 1973 & later)
5. Cylinder boot
6. Stop wire
7. Stop washer
8. Piston assembly
9. Piston assembly
10. Piston return spring
11. Master cylinder
12. Valve (1972 & earlier)
13. Valve seat (1972 & earlier)

master cylinder from the frame to replace the piston assembly.

3. Remove the cotter pin, washer, and clevis pin to free the linkage lever.
4. Disconnect the brake line, remove the mounting bolts, lockwashers and securing bolts, and remove the cylinder from the frame.
5. Loosen the brake adjusting locknut and remove the cylinder clevis and nut.
6. Remove the cylinder pushrod and rubber boot.
7. Remove the stop wire by prying it out with a screwdriver.
8. Slide out the piston and stop washer.
9. Remove the cylinder bolt, gaskets, and cylinder fitting.
10. Remove the cup, spring assembly, and valve by gently pressing them out with a small rod.
11. Remove the filler plug and gasket.

INSPECTION

1. Clean all of the cylinder parts in brake fluid only.
2. Clear, if necessary, the intake and

by-pass ports with a wire run through the filler opening.

3. Replace the cup for wear and replace it if it is grooved by the edge of the by-pass port.

4. If the cup was grooved, smooth the by-pass port edges with a burring tool or with a thin, round file.

5. Hone the master cylinder walls until they are free of pits, scratches, or grooves. After honing, check with a hole gauge to see if the bore has been over-enlarged. Use a burring tool on the by-pass port after the honing.

6. Inspect rubber parts for swelling or softness and replace as necessary.

7. If any of piston assembly is worn, install all of the parts in a repair kit.

ASSEMBLY

1. Assemble in the reverse order of disassembly.

2. Lubricate all internal parts with brake fluid before assembly.

3. Make all connections firm and check for leaks.

4. Bleed the brake system.

5. Adjust the brake linkage.

REAR BRAKE (DRUM)

Disassembly

SPORTSTER

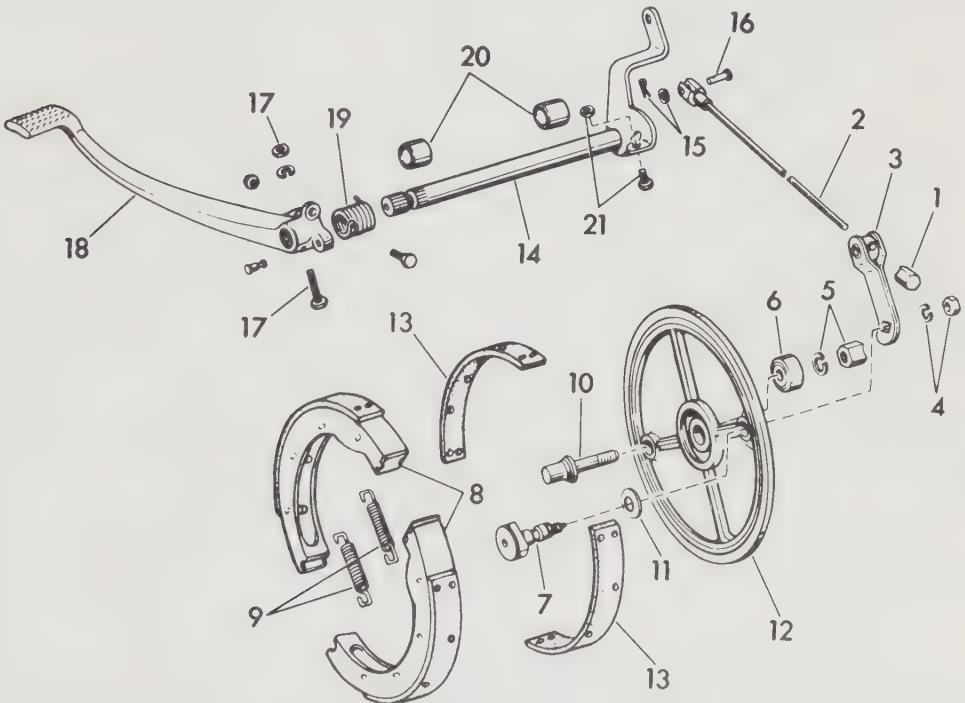
1. Remove the wheel from the motorcycle.

2. Free the brake rod from the operating lever by removing the brake rod adjusting nut.

3. Remove the shaft nut and its lock-washer, operating lever, pivot stud nut and its lockwasher, and the locating block.

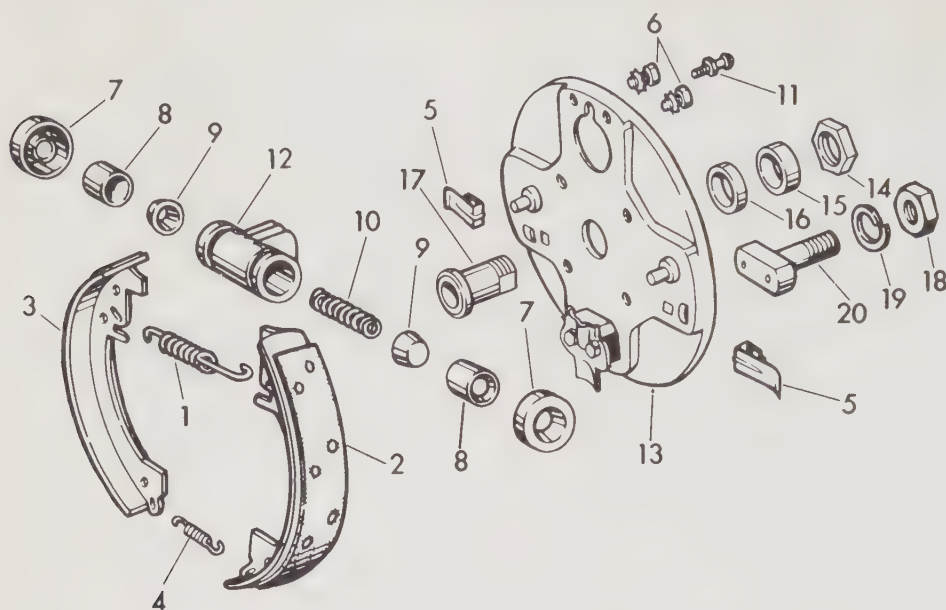
4. Tap with a soft mallet on operating shaft, and shoes, springs, pivot stud, operating shaft, and washer will all fall away from brake side-plate.

5. The shoes will now come free from the operating shaft and pivot stud.



Rear brake and cross-shaft assembly

- | | | |
|--|--------------------------------------|---|
| 1. Brake rod adjusting nut | 8. Shoe and lining (2) | 16. Rod clevis pin |
| 2. Brake rod | 9. Shoe spring (2) | 17. Foot lever bolt and nut |
| 3. Brake operating lever | 10. Pivot stud | 18. Foot lever |
| 4. Operating shaft nut and lock washer | 11. Operating shaft washer | 19. Lever torsion spring |
| 5. Pivot stud nut and lock washer | 12. Brake side plate | 20. Frame brake shaft tube bushing (2) |
| 6. Locating block | 13. Brake lining (2) | 21. Cross shaft adjusting screw and nut |
| 7. Operating shaft | 14. Cross shaft | |
| | 15. Rod clevis cotter pin and washer | |



Rear brake assembly (Glide models)

- | | | |
|---|----------------------|------------------|
| 1. Shoe return spring | 7. Boot (2) | 14. Nut |
| 2. Front brake shoe | 8. Piston (2) | 15. Spacer |
| 3. Rear brake shoe | 9. Cup (2) | 16. Collar |
| 4. Brake shoe spring | 10. Spring | 17. Brake sleeve |
| 5. Hold-down spring (2) | 11. Bleeder nipple | 18. Nut |
| 6. Cylinder screw and lock washer
(2 each) | 12. Wheel cylinder | 19. Lockwasher |
| | 13. Brake side cover | 20. Anchor stud |

GLIDE MODELS

1. Remove the wheel from the motor-cycle.
2. Remove the return spring, anchor spring, and shoes from the side cover.
3. The hold-down leaf springs may now be removed.
4. After removing the cylinder screws and lockwashers, the cylinder will come off from the side-cover.
5. Pry the cylinder boots free and remove the pistons, cups, and springs.

Inspection

ALL MODELS

1. Consult "Front Brake Inspection and Replacement" for the Sportster and all other models with mechanical rear brakes.
2. Follow the same steps for hydraulic rear brakes but inspect the cylinder and side-cover for signs of leakage.
3. Do not operate the brake pedal with the shoes and springs removed from the back plate.

4. Remove all burrs from the cylinder and piston.

5. If the cylinder is faulty, install a repair kit. Dip the parts in brake fluid and use all of the parts provided. Never use gasoline on any hydraulic parts.

Assembly

SPORTSTER

1. Assemble in the reverse order of disassembly.
2. Using one spring, mount the shoes on the operating shaft and pivot stud, taking care to seat the spring in its groove on the back plate.
3. Assemble the operating shaft and washer on the side-plate.
4. Mount the locating block, pivot stud nut and lockwasher, operating lever, and the shaft nut and lockwasher on the shaft.
5. Secure the shoes with a second spring. Use a screwdriver as a lever, or pliers to install it.
6. Place the brake rod through the lever ferrule and secure it with an adjusting nut.

7. Assemble the brake and wheel on the motorcycle.
8. Adjust the adjusting rod and center the shoes.

GLIDE MODELS

1. Assemble in the reverse order of disassembly.
2. Lightly grease the hold-down leaf springs, and the area on the side plate where the shoes seat during operation.
3. Connect the shoes with the lower return spring, place the assembly on the back plate, and secure it with the upper spring, using a screwdriver as a lever or else with pliers.
4. Place the short hook in the elongated hole on the front shoe (when applicable).
5. On 1965 and later Glide models, the shoes are of different widths and the narrow shoe must be on the rear of the back plate.
6. Assemble the wheel on the motorcycle.
7. Adjust the linkage and center the shoes.

REAR BRAKE CROSS-SHAFT MECHANICAL BRAKE MODELS

Disassembly

1. Disconnect but do not remove the rear chain.
2. Remove the rear cylinder exhaust pipe and muffler.
3. Remove the brake rod, clevis pin, cotter pin, washer, and clevis pin from the lever arm.
4. Back off the pinch-bolt until the foot pedal lever and return spring can be slipped from the shaft.
5. Remove the shaft from the right-side of the machine.

Inspection

1. Inspect the shaft and the lever pedal splines, and replace them if they are damaged or worn. Excessive wear will cause the lever to slip on the shaft reducing braking accuracy.
2. Assemble the clevis pin in the rod clevis and check for wear. Replace the pin if it is worn; always replace the cotter pin.
3. Check to see if excessive clearance

has developed between the bushings and shaft; replace the bushings if necessary.

4. Bushings can be drifted out from the frame by threading in a $\frac{3}{4}$ -16 in. tap from the outside of each bushing.

5. Press in new bushings, install the shaft, and check to see that the shaft rotates freely.

6. Ream the bushing to the correct size of high spots developed during drifting.

Assembly

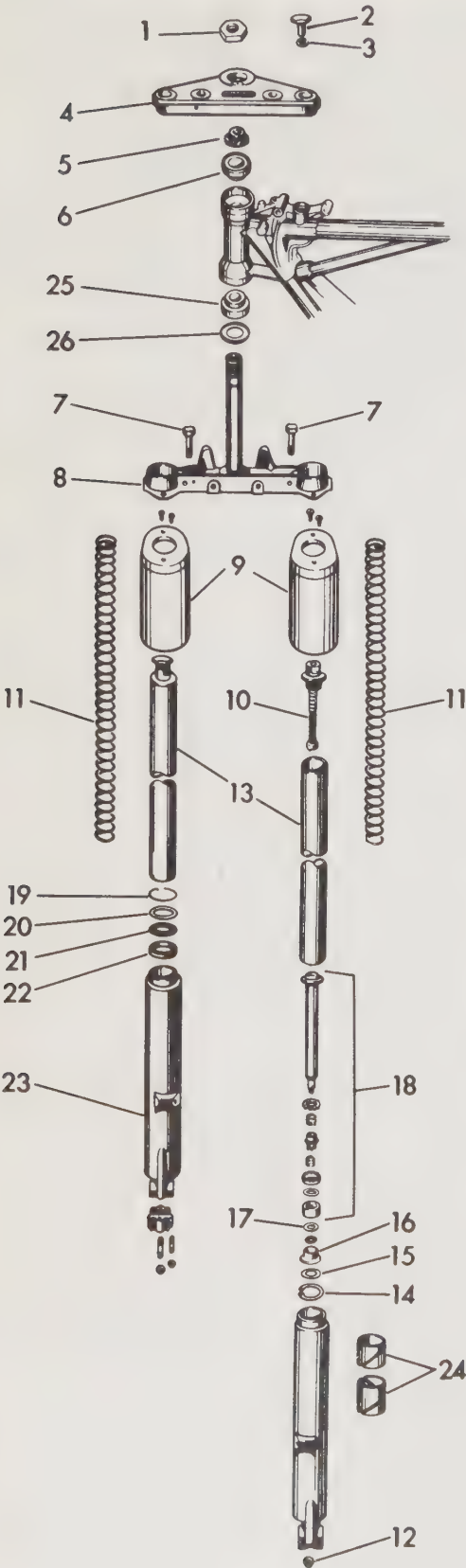
1. Replace bushings if they have been removed.
2. Insert the shaft in the frame tube.
3. Assemble the shaft arm, if it has been removed, and secure it to the brake rod clevis with the pin, washer, and cotter pin.
4. Mount and adjust the chain on the rear sprocket, and assemble the tail pipe and muffler.
5. Set the cross-shaft adjusting screw so that, when it is stopped against the frame, the cross-shaft arm is slightly behind the center of the rear fork pivot bolt. The arm must never be closer than $1\frac{1}{2}$ in. to the inner recess of the transmission sprocket cover.
6. Assemble the brake pedal on the shaft so it lies slightly beneath the foot rest. Adjust the cross-shaft adjusting screw until the pedal is correctly positioned. Always adjust it so the arm moves away from the transmission cover.
7. Secure the cross-shaft bolt locknut.
8. Check the brake pedal adjustment.

Front Fork

FORK SLIDER AND TUBE REMOVAL

(All Models Except
Sportster, FX, and Super Glide)

1. Remove the front wheel as described in the wheels' "Removal and Installation" section.
2. Remove the brake cable clip from the front fender.
3. Remove the axle sleeve nut, pivot stud nut, and brake side-cover and shoe assembly along with the axle sleeve, from the forks.



- 1. Fork stem nut
- 2. Fork upper bracket bolt and valve (2)
- 3. Tube plug oil seal (2)
- 4. Handlebar and fork bracket
- 5. Head bearing nut
- 6. Head bearing (2)
- 7. Fork bracket clamping stud (2)
- 8. Fork bracket with stem
- 9. Fork slider cover (2)
- 10. Slider tube plug (2)
- 11. Fork spring (2)
- 12. Damper valve stud lock nut (2)
- 13. Fork slider tube (2)
- 14. Slider tube snap ring
- 15. Damper tube bushing gasket (2)
- 16. Damper tube lower bushing (2)
- 17. Damper valve stud gasket (2)
- 18. Damper tube valve (2)
- 19. Spring ring (2)
- 20. Spring ring washer (2)
- 21. Upper oil seal felt washer (2)
- 22. Upper oil seal (2)
- 23. Slider (2)
- 24. Slider upper and lower bushing (2 each)
- 25. Head bearing (see item 7)
- 26. Lower head bearing guard

DRAIN
PLUG

Nonadjustable fork assembly (Glide models)

4. Remove the front fender.
5. Loosen but do not remove the front fork bracket clamping studs.
6. Remove the upper bracket bolts, oil seals, and fork slider and slider tube assemblies from the bottom of the slider covers.

PRELIMINARY DISASSEMBLY

1. Remove the headlight cowlings and headlamp.
2. Disconnect all headlight and handle-bar wires at the terminal.
3. Disconnect the throttle and spark cables at the carburetor and the contact breaker.
4. Remove the handlebars.

DISASSEMBLY

Non-Adjustable Glide Models

1. Remove the fork stem nut, nut lock (if applicable), upper bracket bolts, oil seal, upper bracket cover (if applicable), and handlebar and fork bracket.
2. Using Lock Nut Wrench (H-D Part No. 96219-50) or a suitable substitute, remove the head bearing nut, lift the upper bearing free, and pull the fork free from the bottom of the steering head.
3. Loosen, but do not remove, the fork bracket clamping studs and slip the fork bracket and slider cover assembly free of the fork tubes.
4. Remove the slider tube plugs, drain the oil, and remove the fork springs.
5. Remove the damper valve stud lock-nut and free the slider tube from the slider.
6. Remove the slider tube snap-ring with snap-ring pliers. Remove the damper tube lower bushing, damper tube bushing gasket, and damper valve stud gasket. Discard and replace all parts other than the tube assembly.

Adjustable Glide Models

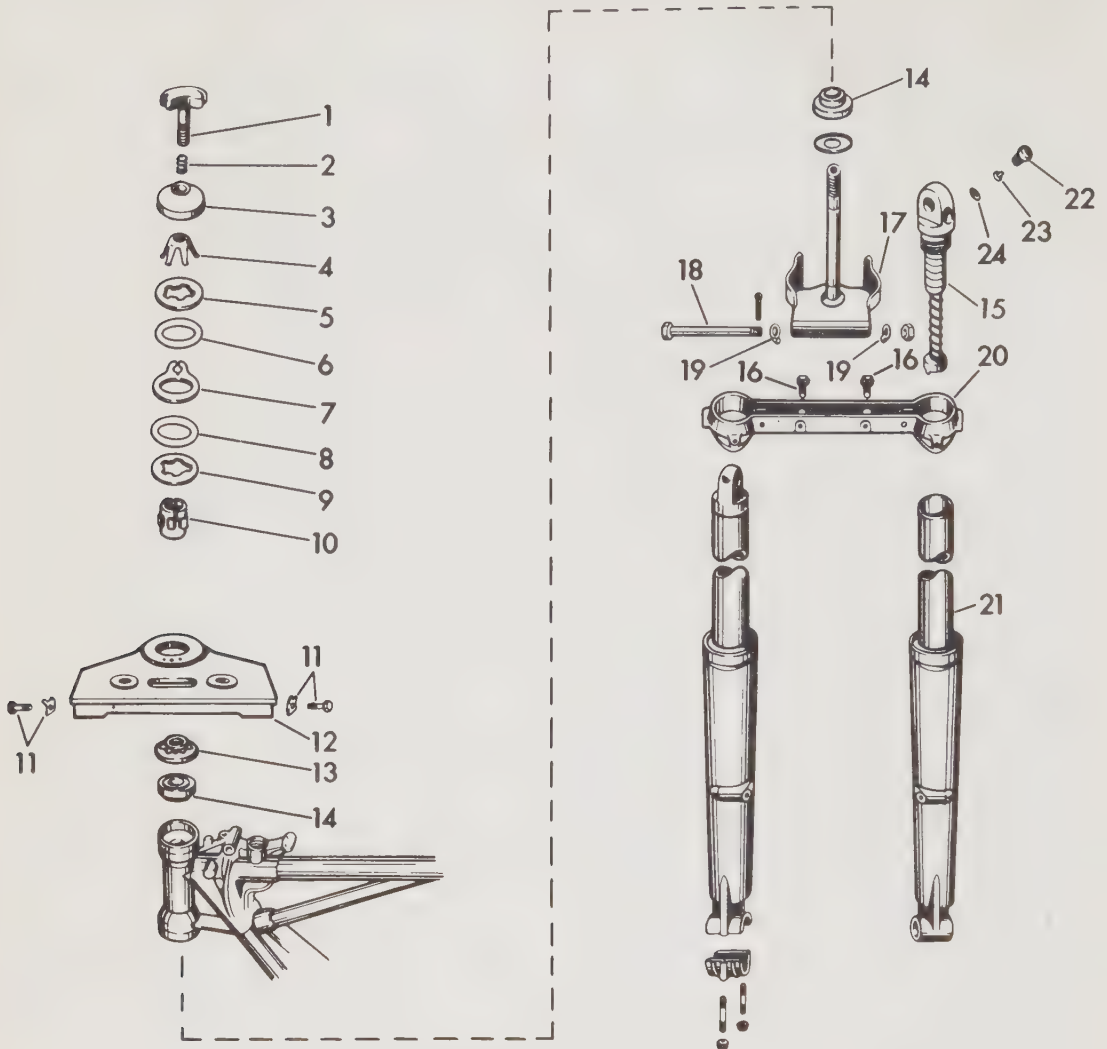
1. Remove the steering damper adjusting screw, spring cover, spider spring, upper pressure disc, friction washer, anchor plate, friction washer, and lower pressure disc by prying all parts loose when necessary.
2. Remove the fork stem nut, upper bracket bolts and washers, bracket cover and bracket.
3. Using Lock Nut Wrench (H-D Part

No. 96219-50) or a suitable substitute, remove the head bearing nut, lift the upper head bearing free, and pull the fork free from the bottom of the steering head.

4. Remove the slider tube plugs.
5. Loosen but do not remove the bracket clamping studs.
6. Continue as described for "Non-Adjustable Glide Models."

INSPECTION

1. Clean all of the parts in a suitable solvent and blow them dry.
2. Inspect the slider tubes and slider for scratches, grooves, wear, and damage, and replace if necessary. Remove minor faults with a fine oil stone or emery paper.
3. Inspect the valve tube assembly components for pitting, rust, wear, and damage, and replace if necessary.
4. Inspect the slider tube plugs for loose cups or damaged springs and replace if necessary. Oil slots in the cups must be arranged on alternate sides.
5. Inspect the steering head bearings and races for pitting, rough motion, wear, or damage, and replace in sets whenever necessary.
6. Bearing races can be drifted free with a suitable drift after the head cups are removed. Replace by pressing new races into the head cup and then pressing both into the head frame.
7. Remove both fork slider bushings, if worn, pitted, or damaged, by installing Fork Slider Bushing Puller (H-D Part No. 96255-50) or a suitable substitute. Oil the tool's threads and washer to ease removal. The bushing may be split with a chisel to remove it if care is taken not to damage the slider.
8. Install the new fork slider bushings with Fork Slider Bushing Driver and Guide (H-D Part No. 96285-50) or a suitable drift, or else use a piece of pipe with the slide secured in a copper or wood-jawed vise. If the proper bushing driver is not available, mark the tube where the bushings were originally as an aid in replacing them correctly. Lubricate the bushing and the tube to aid installation. The lower bushing should seat at a position where the second groove of the driver is aligned with the top of the



Adjustable fork assembly (Glide models)

- | | | |
|------------------------------------|--|--|
| 1. Steering damper adjusting screw | 10. Fork stem nut | 18. Bracket bolt with nut and cotter pin |
| 2. Spring | 11. Upper bracket bolt and washer (2 each) | 19. Bracket bolt washer (2) |
| 3. Spider spring cover | 12. Upper bracket | 20. Bracket |
| 4. Spider spring | 13. Head bearing nut | 21. Fork tube and slider assembly (2) |
| 5. Pressure disc (2) | 14. Head bearing (2) | 22. Filler screw (2) |
| 6. Friction washer (2) | 15. Slider tube plug (2) | 23. Filler screw valve (2) |
| 7. Anchor plate | 16. Bracket clamping stud (2) | 24. Filler screw washer (2) |
| 8. Friction washer (see item 6) | 17. Bracket with stem | |
| 9. Pressure disc (see item 5) | | |

guide. The upper bushing should be $\frac{1}{16}$ in. below the oil seal counterbore.

9. Ream the bushing with Fork Slider Bushing Reamer and Pilots (H-D Part No. 96300-50) or a suitable substitute. Using the long pilot as a guide in the lower bushing, ream the upper bushing by slowly placing the reamer in position while rotating it clockwise. Always continued to rotate the reamer while withdrawing it.

10. Ream the lower bushing with the small pilot as a guide in the same manner as for the upper bushing. Take care not to mar the upper bushing while passing the reamer through it. Pilots can be made from suitably sized lengths of pipe.

Non-Adjustable Front Fork Assembly

1. Install a new upper oil seal and felt washer in a thoroughly cleaned slider.

The oil seal may be seated gently in its counterbore with a mallet and Drive (H-D Part No. 96250-50) or a suitable substitute.

2. Install a new spring ring washer and a new spring ring with its gap over the slider top water drain hole.

3. Assemble the damper valve, new upper gasket, lower bushing, and a new lower gasket.

4. Secure a length of 1 in. steel rod vertically in a vise with 13½ in. above the jaws.

5. Place the inverted slider tube over the steel rod and drop the damper valve assembly in upside down.

6. Secure the slider snap-ring in the slider tube notch and check the clearance between the ring and the lower bushing. Insert shims if they are necessary to bring clearance to a maximum of 0.004 in.

7. Slide the slider over the lubricated slider tube and secure the damper valve stud locknut. Check slider motion for binding or drag. Loosen the locknut and rotate the slider 180 degrees before securing it to eliminate binding.

8. Install the assembled fork bracket and slider covers over the slider tubes so 5/16 in. of tube extends above the top of the bracket and tighten the bracket clamping studs.

9. Fill each tube with Harley-Davidson Fork Oil (oil may be experimented with freely as long as specified quantities are conformed to) or hydraulic fluid, then install the fork springs and secure the slider tube plugs.

10. Secure the lower head bearing guard and a well-packed head bearing on the stem. Install the stem into the steering head.

11. Install a well-packed upper head bearing and secure the head bearing nut until there is slight bearing draw when the head is turned. Back off the nut until the motion is smooth.

12. Install and secure the fork bracket, bracket cover, and slider tube plugs.

13. Loosen the bracket clamping studs and rotate the slider tubes until the tube plug flat sides are to the sides of the forks.

14. Secure the fork stem nut, bracket clamping studs, tube plug oil seals, upper bracket bolts, and handlebar.

15. Complete assembly in the reverse order of disassembly.

ADJUSTABLE FRONT FORK ASSEMBLY

1. Consult "Non-Adjustable Front Fork Assembly."

2. Place the slider tubes in the fork bracket with tubes 5¼ in. above the top of the bracket. The slider tube plug flat surfaces must point toward the filler screw.

ADJUSTING ADJUSTABLE FRONT FORK FOR SIDECAR USE

1. Remove the bracket bolt nut and lockwashers.

2. Loosen the upper bracket bolts.

3. Pull the fork tubes forward until movement is detected.

4. Replace the bracket bolt washers with the pin seated in the bracket boss slot and secure the bracket bolt and nut.

5. To resume solo riding, push the fork tubes back and adjust the washer pins until they point backward.

Sportster and Super Glide Models

BREATHER VALVE REPLACEMENT (1972 AND EARLIER)

1. Remove the headlight housing if it interferes with removing the fork tube cap.

2. Remove the cap and secure it in a wood or copper-jawed vise.

3. Remove the breather valve by breaking the stakings.

4. Apply a suitable sealer when reassembling and stake in the breather valve in three new positions.

FORK BOOT REPLACEMENT (SPORTSTER)

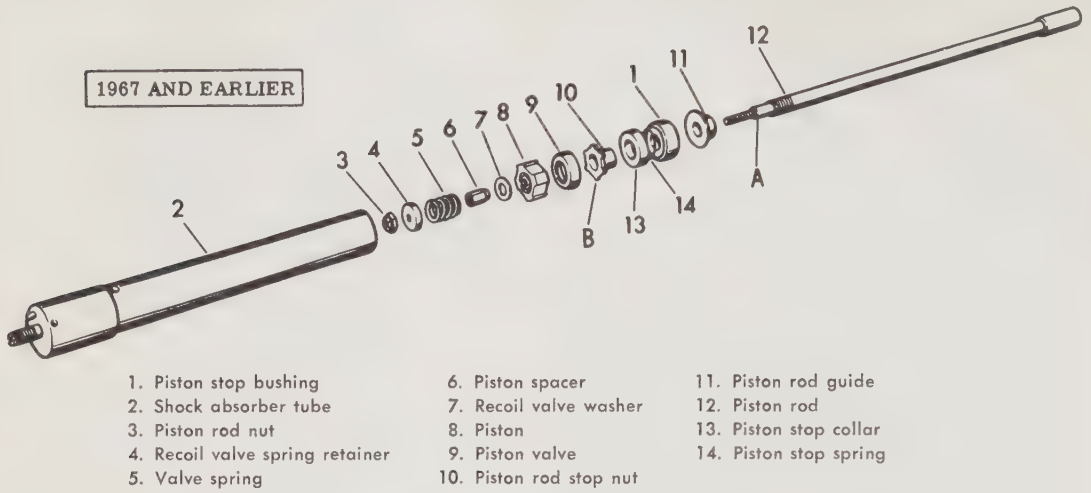
1. Pull the boot free from the upper retainer.

2. Free the fork slider assembly as described in "Fork Slider and Tubes Removal."

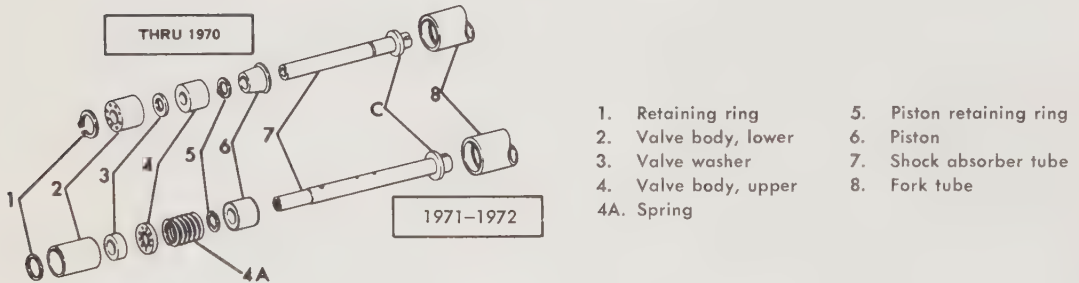
3. Remove the fork vent and plain screws and loosen, but do not remove, the retainer, gasket, and retaining disc.

4. Pry the lower retainer lip to remove it from the slider and then remove the boot.

5. Assemble in the reverse order of disassembly.



Front fork shock absorbers



6. Replace the fork slider bushings first if this is to be done at this time.

7. Secure the upper retainers by sliding them up to the slider counterbore then by inserting the pilot end of the Oil Seal Driver (H-D Part No. 96310-55) through the retainer and into the upper slider bushings. Gently tap the retainer until it is seated. A suitably sized piece of pipe can be used as a drift if the factory tool is not available.

FORK DISASSEMBLY

1. Remove the front wheel and brake assembly as described in the "Removal and Installation" for the wheels.

2. Remove the front fender, headlight cowling, and fork tube caps.

3. Loosen, but do not remove, the fork pinch-bolts and free the fork boot from the upper retainer.

4. Slide the fork leg assemblies free from the bottom.

5. Remove the piston rod (or spring)

retainer with Wrench (H-D Part No. 94694-52) (on 1972 and earlier models) or a suitable substitute. Models earlier than 1968 require compressing the fork spring, securing the top of the shock absorber with vise grips, and then removing the piston rod retainer.

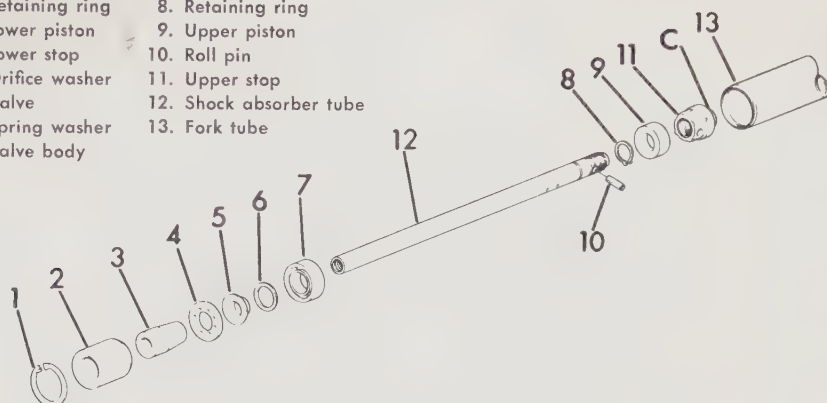
6. Remove the fork spring and drain plug, and allow the hydraulic fluid or fork oil to drain into a suitable container. Keep hydraulic fluid away from painted surfaces since it can cause corrosive damage.

7. Invert the assembly and remove the tube end bolt and washer by securing the slot in the top of the shock absorber tube with a screwdriver and then turning the end bolt. The shocks will come free on 1967 and earlier models. On 1973 and later models use Socket (H-D Part No. 94556-73) or suitable substitute, with extension on the upper end of shock absorber tube cap to keep it from turning.

8. Free the slider front fork tube and shock absorber assembly.

1973 AND LATER

- | | |
|-------------------|-------------------------|
| 1. Retaining ring | 8. Retaining ring |
| 2. Lower piston | 9. Upper piston |
| 3. Lower stop | 10. Roll pin |
| 4. Orifice washer | 11. Upper stop |
| 5. Valve | 12. Shock absorber tube |
| 6. Spring washer | 13. Fork tube |
| 7. Valve body | |



1973 and later fork shock absorber

9. Remove the piston stop bushing with Wrench (H-D Part No. 94691-52) or a suitable substitute and remove from shock absorber tube. Remove the piston rod nut to dismantle the piston rod assembly.

10. Remove the shock absorber retaining ring with snap-ring pliers and slide the lower valve body, washer, upper piston, spring (1971 and later), tube, piston, retaining ring, and piston on 1968 and later models. On 1973 and later models, disassemble the shock absorber as follows: Remove retaining ring from fork tube with snap-ring pliers and remove lower piston, lower stop, orifice washer, valve, spring washer, valve body and upper retaining ring. Disassemble upper stop by removing roll pin from shock absorber tube.

11. Remove the headlight assembly and disconnect the speedometer cable at the speedometer head.

12. Remove the stem sleeve end nut and loosen, but do not remove, the upper bracket pinch-bolt.

13. Remove the handlebar and upper fork bracket assembly and lay it aside. It is not necessary to disconnect the cables or wires as long as they do not bend sharply.

14. Remove the upper bracket spacer, stem sleeve, stem and bracket assembly, upper and lower bearing cones and bearings (and separate for reassembly), and head cups (if necessary). Head cups are easily removed by drifting from the opposite end with a suitable drift.

INSPECTION

1. Consult the previous section.

ASSEMBLY

1. Assemble 1967 and earlier models in the following manner:

- a. Assemble the piston rod guide, piston collar, spring, bushing, and stop nut on the piston rod, with the stop nut face (b) 0.550 in. from the collar (a). Stake around the center of the nut in four new places.

- b. Assemble the piston valve, piston, recoil valve washer, piston spacer, valve spring, valve spring retainer, and piston rod nut onto the piston rod.

- c. Secure the piston stop bushing in the shock absorber tube with Wrench (H-D Part No. 94691-52) or a suitable substitute, until the top of the bushing is flush with the end of the tube. Stake the bushing by punching through the hole in the upper end of the tube.

2. Assemble 1968 and later models in the reverse order of disassembly using new gaskets and snap-rings.

3. Assemble 1967 and earlier model forks in the following manner:

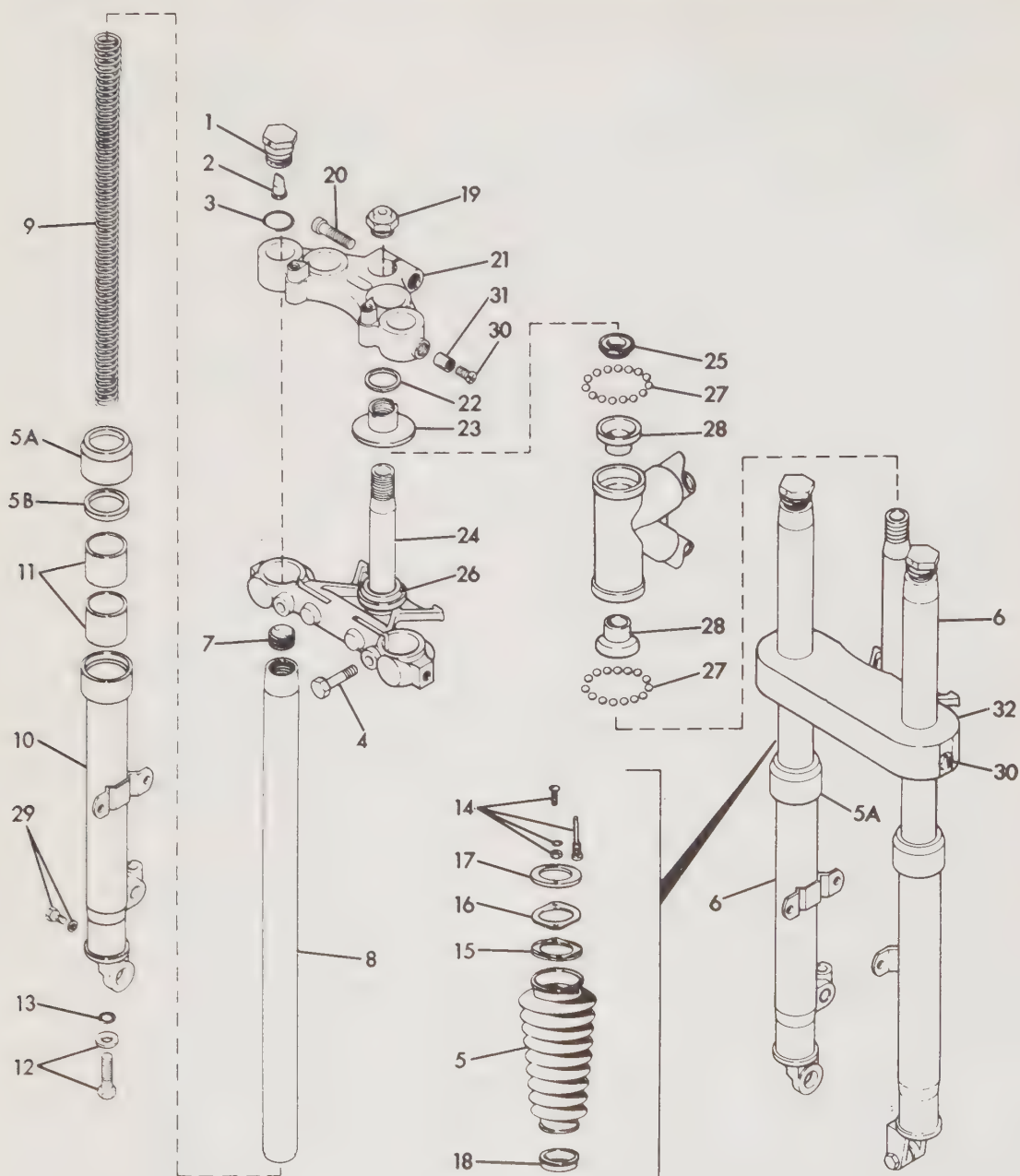
- a. Insert the rod end of the shock absorber in the fork tube.

- b. Place a new shock absorber gasket on the end screw and dowel pin.

- c. Assemble the slider on the fork tube so the tube end screw registers in the slider.

- d. Secure the tube end nut and washer.

- e. Pour 4½ oz of fork oil or hydraulic



Sportster fork assembly

- | | | |
|--|---------------------------------------|-------------------------------|
| 1. Tube cap | 10. Fork slider | 21. Upper bracket |
| 2. Tube breather valve | 11. Fork slider bushing (2) | 22. Upper bracket spacer |
| 3. Tube cap seal | 12. Tube end bolt and washer | 23. Stem sleeve |
| 4. Pinch bolt | 13. O-ring | 24. Stem and bracket assembly |
| 5. Fork boot (1970) | 14. Vent screw and plain screw (1970) | 25. Upper bearing cone |
| 5A. Fork boot (1971) | 15. Boot retainer (upper) (1970) | 26. Lower bearing cone |
| 5B. Seal (1971) | 16. Boot gasket (1970) | 27. Ball bearings (28) |
| 6. Fork side | 17. Boot retaining disc (1970) | 28. Steering head cups (2) |
| 7. Spring retainer | 18. Boot retainer (lower) (1970) | 29. Drain plug and washer |
| 8. Fork tube and shock absorber assembly | 19. Stem sleeve end nut | 30. Cover screw (2) |
| 9. Fork spring | 20. Upper bracket pinch bolt | 31. Insert |
| | | 32. Cover |

fluid over the top of the shock absorber rod and into the tube.

f. Insert the fork spring.

g. Screw a $\frac{5}{16}$ x 24 thread rod (i.e., brake rod) into the end of the shock absorber rod, compress the spring, and grip the flat portions of the rod with vise grips. Remove the threaded rod.

h. Secure the piston rod retainer and remove the grips.

i. Stake the retainer threads through the hole at the top of the absorber rod.

j. Secure the retainer in the fork tube using Wrench (H-D Part No. 94694-52), or a suitable substitute, until the top of the retainer is $\frac{9}{16}$ in. below the top of the fork tube.

4. Assemble 1968 and later models in the following manner:

a. Insert the fork tube and shock absorber assembly into the slider.

b. Hold the slotted top of the shock absorber rod with a screwdriver and secure a new O-ring and the tube end bolt and washer.

c. Insert a spring retainer $\frac{3}{4}$ in. below the surface of the fork tube top using Wrench (H-D Part No. 94694-52) or a suitable substitute.

5. Secure the steering head cups, ball bearings, and bearing cones. Bearing cones must be heavily greased.

6. Install the fork stem and bracket assembly and secure it with a stem sleeve until bearing motion is smooth and free and all excessive play has been taken up.

7. Install the upper bracket spacer, handlebar assembly, and upper fork bracket.

8. Install both assembled fork slides into the mounting brackets and secure the tube caps and then the pinch-bolts.

9. Count and secure the fork bolts.

10. Check fork motion for smoothness and adjust the sleeve if necessary. All side-ways shake should be removed.

11. Secure the upper bracket pinch-bolt and nut, and stem the sleeve end.

2. Remove the rear brake assembly and linkage as described in the brake section.

3. Remove the rear shock absorbers as described in "Rear Shock Absorbers."

4. Remove the exhaust pipe and muffler (if necessary).

5. Remove the pivot bolt and rear fork assembly.

6. Remove the bearing screw, washer, lockwasher, right locknut, and outer spacer. Use a punch to remove the left bearing locknut and pivot bolt nut on Sportster models.

7. Press the bearing inner spacer, bearing, and bearing shield from each side of the fork on Sportster models.

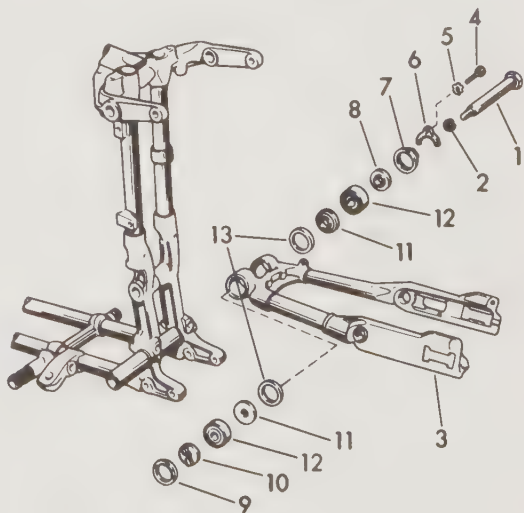
8. Press the bearing spacer, seal, and bearing from each side of the fork (Glide models).

INSPECTION

1. Clean all parts in a suitable solvent and blow them dry.

2. Inspect all parts for wear, pitting, rough bearing motion, or damage, and replace as necessary.

3. Measure the swing arm for correct dimensions as shown and take it to your dealer if alignment or straightening is necessary.



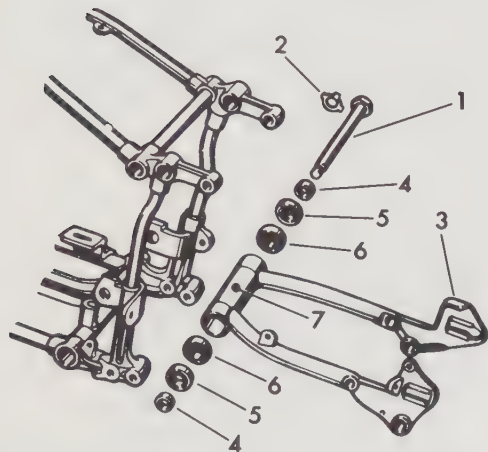
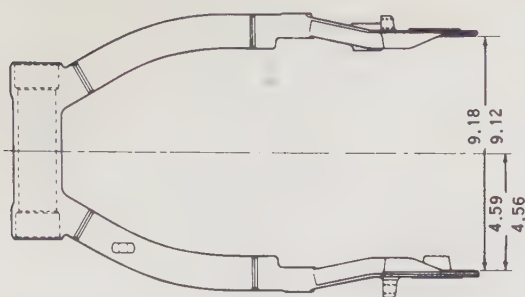
Sportster swing arm

- | | |
|---------------------------|------------------------------|
| 1. Pivot bolt | 8. Outer spacer |
| 2. Bearing lock washer | 9. Bearing lock nut—left |
| 3. Rear fork | 10. Pivot bolt nut |
| 4. Bearing screw | 11. Bearing inner spacer (2) |
| 5. Shakeproof washer | 12. Bearing (2) |
| 6. Lockwasher | 13. Bearing shield (2) |
| 7. Bearing lock nut—right | |

Swing Arm

DISASSEMBLY

1. Remove the rear wheel as described in the "Removal and Installation" section for the wheels.



Glide models swing arm assembly and dimensions

- | | |
|-----------------------------|-------------------|
| 1. Pivot bolt | 5. Bearing seal |
| 2. Pivot bolt lock washer | 6. Bearing |
| 3. Rear fork | 7. Grease fitting |
| 4. Pivot bearing spacer (2) | |

ASSEMBLY

1. Assemble in the reverse order of disassembly.

2. Grease the bearings thoroughly. This must be done every 10,000 miles on Sportsters or it must be greased through the fitting every 2,000 miles on Glide models.

3. Press the bearing shield into the fork from the outside until it is flush with the inside. Insert the bearing with the wide side of the race facing out. Assemble and secure the right bearing locknut and then back it off one full turn. Assemble the pivot bolt nut, then secure the left locknut and stake it in three new places (Sportster models).

4. Apply grease to the bearing seals in the groove between the sealing lips and secure the seals and spacers (Glide models).

5. Preload the bearings in the following manner:

- a. Assemble the pivot bolt.

b. Weigh the extreme rear end of the fork in a horizontal position, with a spring scale, and note the reading.

c. Tighten the pivot bolt (Sportster) or the right locknut (Glide models) until bearing drag is increased by one or two pounds above the original reading.

6. Complete reassembly in the reverse order of disassembly.

Rear Shock Absorbers

Harley-Davidson shock absorbers have three riding positions which are regulated by an adjusting cam. The lowest position, which is off the cam, is for the average (150 lbs) solo rider. The first cam position is for heavy solo riders, and the second cam position is for tandem riding. These various riding positions are selected using the Spanner Wrench (H-D Part No. 94700-52B) to rotate the cam. Shocks are interchangeable from one side to the other, however both must be adjusted on the same position to provide proper balance.

Disassembly is aided by the use of Rear Shock Absorber Tool (H-D Part No. 97010-52A) but any means of compressing the spring for long enough to remove the split key (1967 and later models) will work. This can be done by hand if one person compresses while the other removes the keys.

DISASSEMBLY

1966 and Earlier Models

1. Remove the cover clamp, top cover mounting stud nuts, stud cover, washer, and rubber bushing.

2. Remove the shock from the mounting studs.

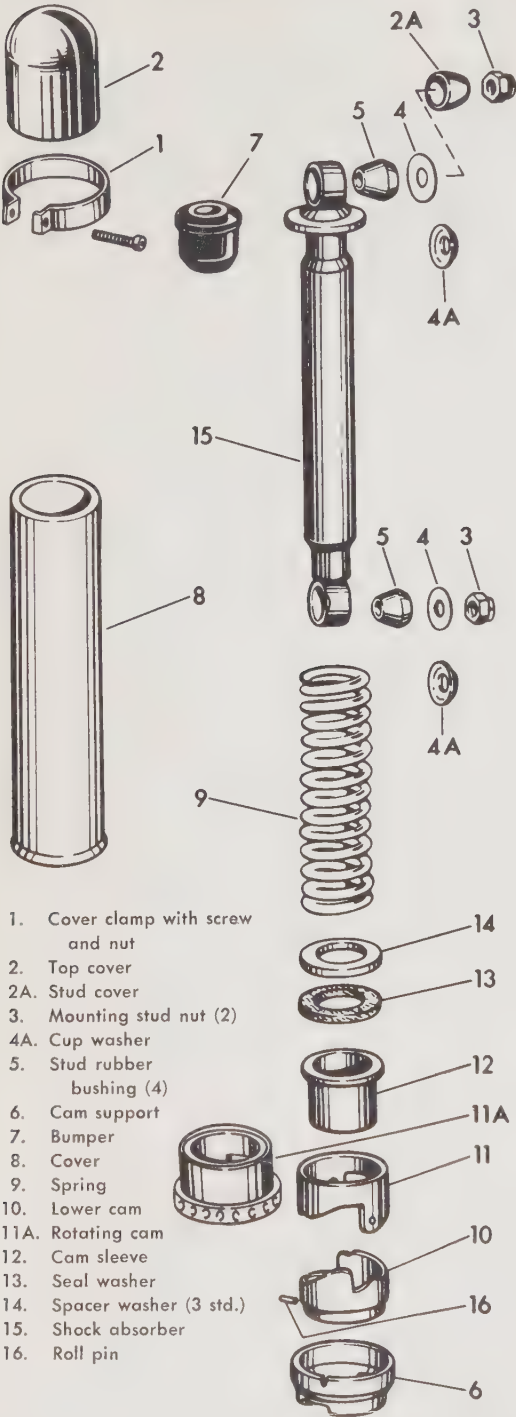
3. Compress the spring until the lower mounting eye can be rotated 90° then remove the shock from the tool (if used).

4. Remove the cam support.

5. Strike the lower mounting eye sharply to free the bumper from the cover flange.

6. Remove the cover and disassemble the lower cam, rotating cam, cam sleeve, dirt seal, and spacer washers.

7. Remove the bumper by extending

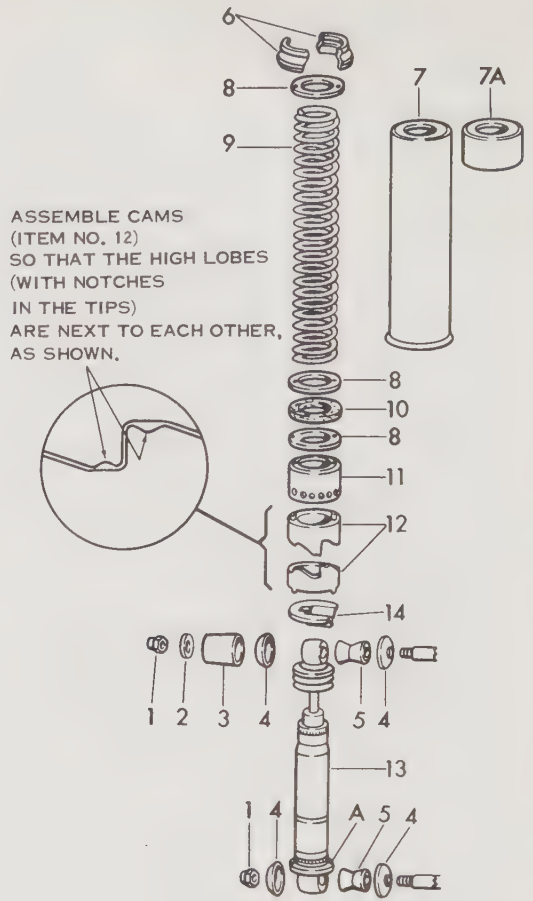


1. Cover clamp with screw and nut
2. Top cover
- 2A. Stud cover
3. Mounting stud nut (2)
- 4A. Cup washer
5. Stud rubber bushing (4)
6. Cam support
7. Bumper
8. Cover
9. Spring
10. Lower cam
- 11A. Rotating cam
12. Cam sleeve
13. Seal washer
14. Spacer washer (3 std.)
15. Shock absorber
16. Roll pin

1965-66 shock absorber assembly

1967 and Later Models

1. Remove the mounting stud nuts, upper stud cover, and cup washers.



ASSEMBLE CAMS (ITEM NO. 12) SO THAT THE HIGH LOBES (WITH NOTCHES IN THE TIPS) ARE NEXT TO EACH OTHER, AS SHOWN.

1967 and later shock absorber assembly

- | | |
|----------------------------|--------------------------------|
| 1. Mounting stud nut (2) | 7A. Cover (short) |
| 2. Mounting stud washer | 8. Washer (3) |
| 3. Stud cover | 9. Spring |
| 4. Cup washer (4) | 10. Seal washer |
| 5. Stud rubber bushing (2) | 11. Adjusting cup |
| 6. Split key | 12. Cam (2) |
| 7. Cover (long) | 13. Shock absorber unit |
| | 14. Cam support (1973 & later) |

2. Remove the shock absorber from the mounting studs.
3. Press the stud rubber bushings from the mounting eyes.
4. Remove the retaining ring.
5. Compress the spring until the split key can be removed.
6. Remove the compression tool (if used) and disassemble the remaining items.

INSPECTION

1. Clean and inspect all parts for wear or damage and replace as necessary.
2. If possible, compare the old springs with new ones to determine wear.

the absorber piston shaft and the springing bumper.

3. Replace absorbers if they are leaking or if the piston does not compress a little more easily than it extends.

ASSEMBLY

1966 and Earlier Models

1. Lightly grease the cam sleeve and cam surface of the adjusting cam.

2. Secure the roller pin in the lower cam and place it on the cam support with the pin and pin slot aligned.

3. Extend the piston rod and assemble the bumper.

4. Assemble the spring in the cover, then the shock in the spring, and strike

the upper mounting eye to secure the bumper in the cover flange.

5. Slip the spacer and seal washers into the cover and complete assembly in the reverse order of disassembly.

6. Compress the spring and rotate the lower mounting eye 90° to secure it in the cam support notch.

1967 and Later Models

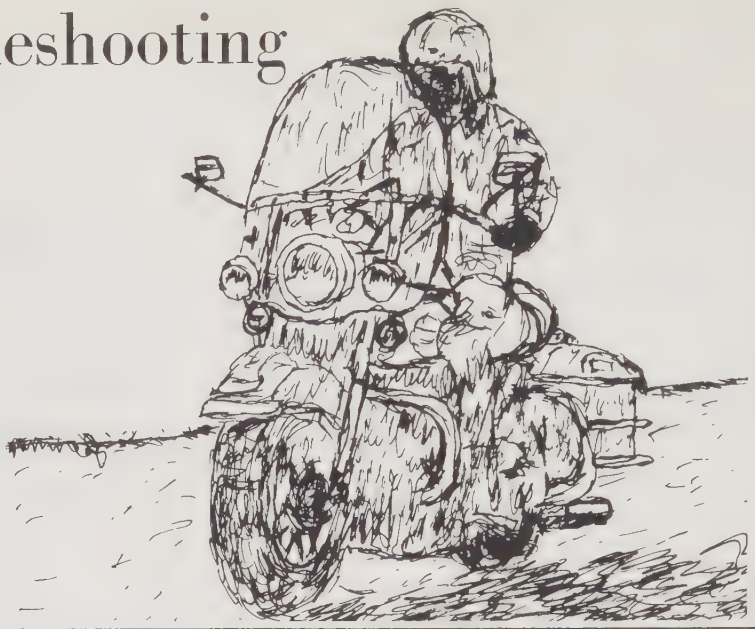
1. Lightly grease the cam surfaces.

2. Assemble in the reverse order of disassembly taking care to align the cam faces.

3. Compress the springs and insert the keys and retaining ring (if applicable).



9 • Troubleshooting



There are certain steps which, if followed, can transform the art of troubleshooting into an exact science. Random efforts often prove confusing, so a logical method should be adopted. Troubleshooting is nothing more than a systematic process of elimination, tracing back and checking various components until the fault is found. In most cases, this takes very little time and very few special tools are required.

Before you start, try to determine if this is a new problem, or one that's been coming on gradually. If you are an aware rider, you'll know whether or not performance has been diminishing, and consulting the troubleshooting guide in this section may provide an immediate answer. Also, whenever a problem shows up just after work has been done on the bike, check those areas that were involved first, regardless of the nature of the work.

When troubleshooting the engine, you will be concerned with three major areas: the ignition system, the fuel system, and compression pressure. The engine needs spark, fuel, and compression to run. The most obvious thing to check first, but which is often overlooked, is the fuel supply. Keep in mind that even if there is gas in the tank, a low supply can sometimes make starting hard. Check to see if you have fuel at the carburetor. If

so, you can be pretty sure that it is not a lack of fuel that is preventing the engine from starting.

As far as compression is concerned, there are only very few conditions that will cause a sudden loss of compression, and such an occurrence will happen only while the engine is running. You should be able to tell if you have normal compression simply by the way the engine sounds and feels as it is cranked over. Or, if you have the spark plugs out, cover the plug holes with your finger and kick the engine over. If the pressure forces your finger off the hole, there should be enough compression for the engine to start. Of course, the most accurate way to check compression is by using a compression gauge.

The final area of investigation is the electrical system. Check to see if you are getting spark to the cylinders by removing the plug leads and inserting a metal object such as a nail into the plug connectors. Using a folded cloth as insulation, hold the nail about $\frac{1}{8}$ in. from the engine and crank the engine over with the ignition on. If you have spark at both leads, remove and check the spark plugs. If not, trace the ignition system back with a test light (simply a 12 volt bulb with two wires attached, used to check electrical continuity). Start by checking for electricity at the points while they are open. If

you have juice there, the problem lies in the coil, spark plug wires, or the wires between the coil and points. If you find that there is no supply of electricity to the coil, start looking for loose connectors in the wire between the coil and ignition switch. Speaking of connectors, whenever you have a problem with the electrical system, they are the first things you should examine.

All of the above can be considered troubleshooting the engine to get it running, not troubleshooting to cure running faults. Once you have found the general location of the trouble, it is usually quite simple to make pinpoint checks or temporarily substitute new parts to determine exactly where the problem lies. The most important thing to remember is to try to remain rational and approach the troubleshooting procedure logically. If you do this, chances are you will find what you are looking for.

DIAGNOSIS OF ENGINE NOISES

Metallic Clatter from the Top End

Clatter is almost always the result of the valves out of adjustment. Paying careful attention to adjustment clearances and procedures will eliminate the noise.

Pinging or Spark Knock under Acceleration

This noise is caused by the fuel mixture in the combustion chamber burning too early or too slowly, which can cause damage to the pistons and valves if it is severe or uncorrected. The most common causes of spark knock are:

- a) Ignition timing incorrect (advanced).
- b) Contaminated or poor quality gasoline.
- c) Excessive carbon buildup in the combustion chambers.
- d) Incorrect spark plug heat range (too hot).
- e) Engine overheating due to weather, traffic, lack of oil, load, lean fuel mixture, etc.

Piston Slap

Piston slap generally occurs at medium engine speeds and is most noticeable when the engine is cold. This metallic slapping noise indicates excessive piston-to-cylinder clearance and necessitates a top end overhaul.

Deep Knock

A loud knock coming from deep inside the engine is usually caused by worn main bearings. Unless the engine has been severely abused or run without oil, you should never encounter this problem.

Rap

A distinctive rap, loudest as the engine decelerates, is indicative of worn connecting rod bearings. Again, this will usually not develop unless the engine has been abused or run without oil.

Double Rap

Two raps heard regularly in quick succession, when the engine is under a light load, means that the piston wrist pins are worn. This should only occur on a very high-mileage machine.

Engine Troubleshooting

Engine fails to start

Possible Causes	Remedy
Gas tank empty, fuel petcock off, or fuel line clogged	Fill tank, open petcock, or disconnect and blow out gas line
Engine flooded	Remove spark plugs and dry out
Insufficiently charged battery	Check electrolyte level and charge battery
Corroded, loose, or broken battery terminal connections	Clean, secure, and/or replace
Fouled or improperly gapped spark plugs	Clean and gap, or replace. Consult "Spark Plug" section
Spark plug cables leaking or damaged	Consult "Ignition Coil" section

Engine Troubleshooting (cont.)

Engine fails to start

<i>Possible Causes</i>	<i>Remedy</i>
Badly oxidized or dirty contact points	Consult "Contact Breaker Point" section
Contact breaker points or ignition timing out of adjustment	Consult "Contact Breaker Point" section
Loose connection in ignition circuit	Check wiring harness connections
Defective ignition coil or condenser	Replace
Clutch slipping and not turning engine over	Consult "Clutch" section
Valves sticking or too tight	Consult "Valve Tappet Adjustment"
Engine and transmission oil too heavy for climatic conditions	Drain oil and replace with a lighter grade

Engine is hard to start

<i>Possible Causes</i>	<i>Remedy</i>
Spark plugs in bad condition or partially fouled	Consult "Spark Plug" section
Spark plug cable in bad condition and leaking	Consult "Ignition Coil" section
Contact breaker points dirty, pitted, or out of adjustment	Consult "Contact Breaker Point" section
Battery insufficiently charged	Check electrolyte level and charge battery
Carburetor out of adjustment	Consult "Carburetor Adjustment"
Defective ignition coil or condenser	Replace
Oil too heavy for climatic conditions	Drain oil and replace with a lighter grade
Ignition timing out of adjustment	Consult "Contact Point," "Contact Breakers" or "Magnet" section
Loose or intermittently grounded wires at battery, coil, or contact breaker	Check connections
Poor compression	Consult "Tune-Up Analysis" section
Contact breaker advance mechanism sticking	Consult "Contact Breaker Point" section

Starter motor fails to operate or start engine

<i>Possible Causes</i>	<i>Remedy</i>
Transmission not in neutral	Select neutral
Battery insufficiently charged, or loose or corroded connections	Check electrolyte level, charge battery, and check connections
Starter relay, control circuit, or solenoid defective	Consult "Starter Motor" section
Clutch slipping	Consult "Clutch" section
Electric starter shaft pinion gear not engaging	Consult "Starter Motor" section

Engine idles poorly and misfires during acceleration

<i>Possible Causes</i>	<i>Remedy</i>
Spark plugs dirty	Clean as described in "Spark Plugs" section
Weak spark	Consult "Electrical Troubleshooting" section
Poor connection at spark plug cable	Check
Air leakage at carburetor manifold	Consult "Carburetor" section
Obstruction in carburetor main jet	Consult "Carburetor" section
Incorrect carburetor adjustment	Consult "Carburetor Adjustment" section
Water in carburetor	Disassemble and clean
Mixture too rich (mid throttle range misfire)	Consult "Tune-Up Analysis"
Retarded ignition timing (low speed poor performance)	Consult "Contact Breaker Point" or "Magnet" section
Automatic advance unit sticking (poor low speed performance)	Lubricate breaker cam

Engine Troubleshooting (cont.)

Spark plug fouls repeatedly

<i>Possible Causes</i>	<i>Remedy</i>
Too cold a plug for the type of service	Use a plug one step hotter
Piston rings badly worn	Replace as directed in "Engine Repair" section
Cracked ceramic portion of spark plug	Replace plug
Too rich a fuel mixture	See "Tune-Up Analysis"

Loss of compression and power

<i>Possible Causes</i>	<i>Remedy</i>
Valves sticking due to gummed valve stems	Consult "Valve Tappets and Guides" section for valve service procedures
Valve tappets set too close or too wide	Consult "Valve Tappet Adjustment" section
Collapsed or damaged piston	Replace as described in "Engine Top End Service" section
Badly worn piston rings	Replace as described in "Engine Top End Service" section
Damaged head gasket	Replace as described in "Engine Top End Service" section

Engine partially seizes or slows after sustained high speed operation

<i>Possible Causes</i>	<i>Remedy</i>
Spark plug too hot and causing pre-ignition	Use a plug one step cooler
Piston Seizure	Replace piston and rings as described in "Engine Repair" section
Carburetor mixture too lean causing overheating	Consult "Carburetor Adjustment" and "Tune-Up Analysis" sections
Insufficient oil supply, oil not circulating, or pump working insufficiently	Consult "Lubrication Systems"

Engine overheats

<i>Possible Causes</i>	<i>Remedy</i>
Valves or rings excessively worn	Consult "Engine Top End Service"
Insufficient oil supply, oil not circulating, or pump working insufficiently	Consult "Lubrication Systems"
Heavy carbon deposits on piston crown	Consult "Engine Top End Service"
Retarded ignition timing	Consult "Ignition Timing" section
Automatic advance unit sticking in the retarded position	Lubricate the breaker cam

Engine detonates or preignites

<i>Possible Causes</i>	<i>Remedy</i>
Spark plug too hot for service application	Use a plug one step cooler
Spark excessively advanced	Consult "Ignition Timing" section
Carburetor mixture too lean	Consult "Carburetor Adjustment" section
Excessive carbon deposits on piston crown	Consult "Engine Top End Service"
Fuel octane rating too low	Use higher quality fuel

Engine Troubleshooting (cont.)

Engine backfires or kick-starter kicks back

Possible Causes	Remedy
Spark advanced too much	Use less spark during starting or retard ignition timing slightly
Automatic advance unit sticking	Lubricate breaker cam

Engine uses too much oil

Possible Causes	Remedy
Breather valve incorrectly timed	Consult “Breather Valve Timing” section
Piston rings worn or frozen	Replace as directed in “Engine Top End Service” section
Chain oiler excessively open	Consult “Maintenance” section
Oil leak to outside	Replace gasket or seal
Oil grade too light	Drain and use a heavier grade oil

Oil does not return to tank

Possible Causes	Remedy
Oil tank empty	Replenish oil supply
Scavenger pump gear sheared	Consult “Lubrication Systems”
Oil feed pump gear sheared	Consult “Lubrication Systems”
Oil return line clogged	Consult “Lubrication Systems”

Contact points burn or pit rapidly

Possible Causes	Remedy
Defective condenser	Replace as directed in “Contact Breaker Points” section
Loose condenser terminals	Secure terminals
Loose or dirty battery terminals	Secure and clean terminals
Dirty contact points	Clean points

Rapid piston and cylinder wear

Possible Causes	Remedy
Operating in dusty conditions without an air cleaner or with a dirty or clogged air cleaner element	Install air cleaner or replace element

Clutch and Transmission Troubleshooting

Clutch slips

Possible Causes	Remedy
Release mechanism improperly adjusted	Adjust as directed in “Maintenance” and/or the “Drive” and “Transmission” sections
Release worm and lever sticking	Check cable for binding, and lever spring for damage as described in “Clutch” section
Clutch spring tension too loose	Adjust as described in “Maintenance” section
Friction discs worn or oil-impregnated	Replace as directed in “Clutch” section

Clutch and Transmission Troubleshooting (cont.)

Clutch drags

<i>Possible Causes</i>	<i>Remedy</i>
Release mechanism incorrectly adjusted	Adjust as described in "Clutch" section
Release worm and lever excessively worn	Replace as described in "Clutch" section
Clutch spring tension too tight	Adjust as described in "Maintenance" section
Friction discs grimy	Replace as described in "Clutch" section
Steel plates warped	Replace as described in "Clutch" section
Clutch sprocket keys excessively worn or damaged	Replace as described in "Clutch" section

Clutch chatters

<i>Possible Causes</i>	<i>Remedy</i>
Clutch disc rivets loose	Replace as described in "Clutch" section
Clutch sprung disc excessively flattened	Replace as described in "Clutch" section

Grinding when shifting (especially First gear)

<i>Possible Causes</i>	<i>Remedy</i>
Clutch drags	Replace or readjust as described in "Clutch" and "Maintenance" sections
Transmission oil too heavy	Drain and refill with a lighter grade oil

Transmission jumps out of gear

<i>Possible Causes</i>	<i>Remedy</i>
Shifter rods improperly adjusted	Consult "Transmission" section
Shifter forks improperly adjusted	Consult "Transmission" section
Insufficient spring tension	Consult "Transmission" section
Worn gear dogs	Consult "Transmission" section
Worn cam plate	Consult "Transmission" section
Shift linkage improperly adjusted	Consult "Clutch" section

Transmission shifts hard

<i>Possible Causes</i>	<i>Remedy</i>
Clutch dragging	Consult "Clutch" section
Transmission oil too heavy	Drain and refill with a lighter grade oil
Bent shifter rods	Replace as directed in "Transmission" section
Shifter forks bent due to excessive force used when shifting	Replace as directed in "Transmission" section
Worn gear dogs	Replace as directed in "Transmission" section

Chain noise

<i>Possible Causes</i>	<i>Remedy</i>
Chain slaps due to excessive play	Adjust as described in "Maintenance" section
Chain whines due to insufficient play	Adjust as described in "Maintenance" section

Carburetor Troubleshooting

Carburetor floods repeatedly

Possible Causes	Remedy
Float set too high	Reposition float as described in “Carburetor” section
Fuel inlet valve sticking	Free valve and clean seat as described in “Carburetor” section
Fuel inlet valve and/or valve seat worn or damaged	Replace as described in “Carburetor” section
Dirt or other foreign matter between fuel inlet valve and its seat	Blow passages clear as described in “Carburetor” section
Carburetor float sticking due to improper alignment in bowl	Reposition float as described in “Carburetor” section
Carburetor inlet lever improperly set	Reset correctly as described in “Carburetor” section
Diaphragm incorrectly assembled	Correct as described in “Carburetor” section

Idle mixture too rich

Possible Causes	Remedy
Dirt or other foreign matter in idle channel	Blow passage clear as described in “Carburetor” section
Intermediate needle adjusted too lean	Readjust as described in “Carburetor Adjustment” section
Welch plug or channel plugs missing or leaking	Replace as described in “Carburetor” section
Nozzle check valve not seating	Blow passage clear as described in “Carburetor” section

Lean mixture at sustained midrange speeds

Possible Causes	Remedy
Intermediate adjustment too lean	Adjust as described in “Carburetor Adjustment” section
Dirt or other foreign matter in fuel ports or channels	Blow clear as described in “Carburetor” section
Welch plugs or channel plugs missing or leaking	Replace as described in “Carburetor” section
Nozzle check valve not seating	Blow clear as described in “Carburetor” section
Intermediate adjustment packing missing or damaged	Replace as described in “Carburetor” section
Economizer check ball stuck closed	Remove welch plug, inspect ball, blow passages clear as described in “Carburetor” section

Lean mixture at sustained high speeds

Possible Causes	Remedy
Dirt or other foreign matter in nozzle system	Blow clear as described in “Carburetor” section
Main jet too small, damaged or blocked	Replace as described in “Carburetor” section
Main jet plug screw not secured	Secure as described in “Carburetor” section
Nozzle check valve damaged or incorrectly seated	Reseat until flush as described in “Carburetor” section

Carburetor Troubleshooting (cont.)

Lean mixture during acceleration

<i>Possible Causes</i>	<i>Remedy</i>
Dirt or other foreign matter in fuel channels	Blow clear as described in "Carburetor" section
Improper carburetor adjustment	Adjust carburetor as directed in "Tune-Up" section
Accelerator pump damaged or worn	Replace as described in "Carburetor" section
Diaphragm cover screw missing or loose	Secure or replace as described in "Carburetor" section
Diaphragm valves worn or damaged	Replace as described in "Carburetor" section
Economizer check ball stuck closed	Remove welch plug, inspect ball, blow passages clear as described in "Carburetor" section

Lean mixture throughout throttle range

<i>Possible Causes</i>	<i>Remedy</i>
Filter screens plugged or dirty	Clean or replace as described in "Carburetor" section
Inlet lever incorrectly positioned	Readjust lever as described in "Carburetor" section
Diaphragm cover plate loose	Secure as described in "Carburetor" section
Air leak in metering system	Replace or secure all channel plugs, screws, and lead plugs as described in "Carburetor" section
Air leak at intake manifold	Secure manifold or replace gasket as described in "Carburetor" section
Inlet spring worn or damaged	Replace as described in "Carburetor" section

Idle mixture too lean

<i>Possible Causes</i>	<i>Remedy</i>
Carburetor flooding	See above
Idle adjustment screw blunt	Replace as described in "Carburetor" section
Idle adjustment hole damaged or oversize	Replace carburetor body

Rich mixture at sustained mid-range speeds

<i>Possible Causes</i>	<i>Remedy</i>
Intermediate jet adjustment too rich	Adjust as directed in "Tune-Up" section
Main jet too large, loose, or missing	Replace or secure as directed in "Carburetor" section
Carburetor flooding	See above
Nozzle check valve welch plug loose	Secure as directed in "Carburetor" section
Choke improperly adjusted	Adjust as directed in "Tune-Up" section

Rich mixture at sustained high speeds

<i>Possible Causes</i>	<i>Remedy</i>
Main jet too large, or loose	Replace or secure as directed in "Carburetor" section
Carburetor flooding	See above
Economizer check ball stuck open	Remove welch plug, inspect ball, and blow passage clear as directed in "Carburetor Adjustment" section

Carburetor Troubleshooting (cont.)

Rich mixture throughout throttle range

<i>Possible Causes</i>	<i>Remedy</i>
Carburetor flooding	See above
Choke valve partially closed	Inspect friction spring and ball assembly as directed in "Carburetor" section
Choke improperly adjusted	Adjust as directed in "Tune-Up" section

Electrical Troubleshooting

Generator does not charge

<i>Possible Causes</i>	<i>Remedy</i>
Brushes badly worn	Replace as directed in "Generator" section
Brushes sticking in holders	Free or replace as directed in "Generator" section
Voltage regulator improperly grounded	Check ground as directed in "Generator" section
Voltage regulator defective	Replace as directed in "Generator" section
Dirty or oily commutator	Clean as directed in "Generator" section
Grounded positive brush holder	Check or replace as directed in "Generator" section
Grounded generator "A" terminal	Check or replace as directed in "Generator" section
Loose or broken lead in battery-generator circuit	Check or replace as directed in "Generator" section
Loose coil terminals or broken field coil wire	Secure or replace as described in "Generator" section
Shorted commutator	Check or replace as directed in "Generator" section
Defective armature	Replace as directed in "Generator" section
Cut-out points not closing	Touch points together briefly with engine running

Generator charging rate below normal

<i>Possible Causes</i>	<i>Remedy</i>
Incorrectly adjusted voltage regulator	Consult "Electrical Systems" section
Loose coil terminals or broken field coil wire	Consult "Electrical Systems" section
Commutator worn and throwing brushes at high speeds	Consult "Electrical Systems" section
Brushes sticking in holders	Consult "Electrical Systems" section
Defective armature	Consult "Electrical Systems" section

Alternator fails to charge or charging rate is below normal

<i>Possible Causes</i>	<i>Remedy</i>
Defective rectifier	Replace
Defective alternator	Consult "Electrical Systems"
Poor connections in battery-regulator-alternator circuit	Check connections

Chassis Troubleshooting

Excessive vibration

<i>Possible Causes</i>	<i>Remedy</i>
Cylinder head bracket loose or broken	Secure or replace
Engine mounting bolts loose	Secure
Broken frame	Consult your dealer
Primary chain badly worn, insufficiently lubricated or too tight	Consult "Maintenance" and/or "Engine Transmission" section
Loose axle nuts	Secure
Excessive wheel hub radial play	Replace wheel hub bearings as described in "Chassis" section
Loose spokes	Secure
Rear wheel out of alignment	Align rear axle to path of front wheel
Wheel rims out of true	Consult "Chassis" section
Tires unevenly worn	Replace and check wheel alignment and true
Tires incorrectly inflated	Correct as specified
Worn steering head bearings	Replace as directed in "Front Fork" section
Worn rear shocks or shock bushings	Replace as described in "Swing Arm" section
Swing arm bushings too tight or too loose	Replace as described in "Swing Arm" section
Excessive front end loading	Remove excessive weight from the front end

Poor front fork operation

<i>Possible Causes</i>	<i>Remedy</i>
Fork oil contaminated	Drain and replace
Worn or leaky seals evidenced by dirt or water in the fork oil	Replace seals as described in "Front Fork" section
Worn breather valve (leaks below 15 lbs air pressure)	Replace as described in "Front Fork" section
Worn shock absorber or collapsed spring	Replace as described in "Front Fork" section
Excessive clearance in slider bushings as evidenced by excessive play between slider and tube	Replace as described in "Front Fork" section
Bent tubes, stem, brackets or sliders	Consult your dealer

Faulty hydraulic disc brake operation

<i>Possible Causes</i>	<i>Remedy</i>
Excessive hand-lever play caused by:	
Air in system	Bleed system as described in "Brakes" section
Master cylinder low on fluid	Fill master cylinder
Chattering noise when brake is applied caused by:	
Worn or defective disc pads	Replace as directed in "Brakes" section
Loose mounting bolts	Secure
Warped disc	Replace as directed in "Brakes" section
Brake fails to hold (lever travels to its stop) caused by:	
Master cylinder low on fluid	Fill master cylinder
Piston seal O-ring leaks	Replace as directed in "Brakes" section
Brake fails to hold (lever travels normally) caused by:	
Distorted disc	Replace as directed in "Brakes" section
Distorted, worn or contaminated pads	Replace as directed in "Brakes" section
Brake pads remain on disc caused by:	
Loose adjusting ring	Replace as directed in "Brakes" section
Piston binding in bore	Replace as directed in "Brakes" section
Relief port blocked by piston in master cylinder	Replace as directed in "Brakes" section

Chassis Troubleshooting (cont.)

Brakes do not hold (drum brakes)

Possible Causes	Remedy
Brake pads glazed or worn	Replace as directed in “Brakes” section
Brake pads oil-impregnated	Replace as directed in “Brakes” section
Brake linkage improperly adjusted	Readjust as directed in “Maintenance” section
Brake control cables improperly lubricated	Lubricate
Brake drum worn or damaged	Replace as directed in “Brakes” section

Appendix

Conversion Chart

<i>To change</i>	<i>Multiply</i>
cc $\longrightarrow$ cu in.	cc $\times$ 0.0610 = cubic inches
cc $\longrightarrow$ oz (Imp)	cc $\times$ 0.02816 = ounces (Imperial)
cc $\longrightarrow$ oz (U.S.)	cc $\times$ 0.03381 = ounces (U.S.)
cu in $\longrightarrow$ cc	cu in. $\times$ 16.39 = cubic centimeters
ft-lb $\longrightarrow$ in. lbs	ft-lb $\times$ 12 = inch pounds
ft-lb $\longrightarrow$ kg-M	ft-lb $\times$ 0.1383 = kilogram-meters
gal (Imp) $\longrightarrow$ liter	Imp gal $\times$ 4.546 = liters
gal (U.S.) $\longrightarrow$ liter	U.S. gal $\times$ 3.785 = liters
in $\longrightarrow$ mm	in $\times$ 25.40 = millimeters
kg $\longrightarrow$ lbs	kg $\times$ 2.205 = pounds
kg-M $\longrightarrow$ ft lbs	kg-M $\times$ 7.233 = foot-pounds
kg/sq cm $\longrightarrow$ lbs/sq in	kg/sq cm $\times$ 14.22 = pounds/square inch
km $\longrightarrow$ mi	km $\times$ 0.6214 = miles
lb $\longrightarrow$ kg	lb $\times$ 0.4536 = kilograms
lb/sq in $\longrightarrow$ kg/sq cm	lb/sq in. $\times$ 0.0703 = kilograms/square centimeter
liter $\longrightarrow$ cc	liter $\times$ 1,000 = cc
liter $\longrightarrow$ oz (U.S.)	liter $\times$ 33.81 = ounces (U.S.)
liter $\longrightarrow$ qt (Imp)	liter $\times$ 0.8799 = quarts (Imperial)
liter $\longrightarrow$ qt (U.S.)	liter $\times$ 1.0567 = quarts (U.S.)
mi $\longrightarrow$ km	mi $\times$ 1.6093 = kilometers
mm $\longrightarrow$ in	mm $\times$ 0.03937 = inches
qt (Imp) $\longrightarrow$ liter	Imp qt $\times$ 1.1365 = liters
qt (U.S.) $\longrightarrow$ liter	U.S. qt $\times$ 0.9463 = liters

Conversion—Common Fractions to Decimals and Millimeters

INCHES			INCHES			INCHES		
Common Fractions	Decimal Fractions	Millimeters (approx.)	Common Fractions	Decimal Fractions	Millimeters (approx.)	Common Fractions	Decimal Fractions	Millimeters (approx.)
1/128	.008	0.20	11/32	.344	8.73	43/64	.672	17.07
1/64	.016	0.40	23/64	.359	9.13	11/16	.688	17.48
1/32	.031	0.79	3/8	.375	9.53	45/64	.703	17.86
3/64	.047	1.19	25/64	.391	9.92	23/32	.719	18.26
1/16	.063	1.59	13/32	.406	10.32	47/64	.734	18.65
5/64	.078	1.98	27/64	.422	10.72	3/4	.750	19.05
3/32	.094	2.38	7/16	.438	11.11	49/64	.766	19.45
7/64	.109	2.78	29/64	.453	11.51	25/32	.781	19.84
1/8	.125	3.18	15/32	.469	11.91	51/64	.797	20.24
9/64	.141	3.57	31/64	.484	12.30	13/16	.813	20.64
5/32	.156	3.97	1/2	.500	12.70	53/64	.828	21.03
11/64	.172	4.37	33/64	.516	13.10	27/32	.844	21.43
3/16	.188	4.76	17/32	.531	13.49	55/64	.859	21.83
13/64	.203	5.16	35/64	.547	13.89	7/8	.875	22.23
7/32	.219	5.56	9/16	.563	14.29	57/64	.891	22.62
15/64	.234	5.95	37/64	.578	14.68	29/32	.906	23.02
1/4	.250	6.35	19/32	.594	15.08	59/64	.922	23.42
17/64	.266	6.75	39/64	.609	15.48	15/16	.938	23.81
9/32	.281	7.14	5/8	.625	15.88	61/64	.953	24.21
19/64	.297	7.54	41/64	.641	16.27	31/32	.969	24.61
5/16	.313	7.94	21/32	.656	16.67	63/64	.984	25.00
21/64	.328	8.33						

Tap Drill Sizes

National Fine or S.A.E.		
Screw & Tap Size	Threads Per Inch	Use Drill Number
No. 5	44	37
No. 6	40	33
No. 8	36	29
No. 10	32	21
No. 12	28	15
1/4	28	3
5/16	24	1
3/8	24	Q
7/16	20	W
1/2	20	29/64
9/16	18	33/64
5/8	18	37/64
3/4	16	11/16
7/8	14	13/16
1 1/4	12	1 3/64
1 1/4	12	1 11/64
1 1/2	12	1 27/64

National Coarse or U.S.S.		
Screw & Tap Size	Threads Per Inch	Use Drill Number
No. 5	40	39
No. 6	32	36
No. 8	32	29
No. 10	24	25
No. 12	24	17
1/4	20	8
5/16	18	F
3/8	16	5/16
7/16	14	U
1/2	13	27/64
9/16	12	31/64
5/8	11	17/32
3/4	10	21/32
7/8	9	49/64
1	8	7/8
1 1/8	7	63/64
1 1/4	7	1 1/64
1 1/2	6	1 11/32

Conversion—Millimeters to Decimal Inches

mm	inches	mm	inches	mm	inches	mm	inches	mm	inches
1	.039 370	31	1.220 470	61	2.401 570	91	3.582 670	210	8.267 700
2	.078 740	32	1.259 840	62	2.440 940	92	3.622 040	220	8.661 400
3	.118 110	33	1.299 210	63	2.480 310	93	3.661 410	230	9.055 100
4	.157 480	34	1.338 580	64	2.519 680	94	3.700 780	240	9.448 800
5	.196 850	35	1.377 949	65	2.559 050	95	3.740 150	250	9.842 500
6	.236 220	36	1.417 319	66	2.598 420	96	3.779 520	260	10.236 200
7	.275 590	37	1.456 689	67	2.637 790	97	3.818 890	270	10.629 900
8	.314 960	38	1.496 050	68	2.677 160	98	3.858 260	280	11.032 600
9	.354 330	39	1.535 430	69	2.716 530	99	3.897 630	290	11.417 300
10	.393 700	40	1.574 800	70	2.755 900	100	3.937 000	300	11.811 000
11	.433 070	41	1.614 170	71	2.795 270	105	4.133 848	310	12.204 700
12	.472 440	42	1.653 540	72	2.834 640	110	4.330 700	320	12.598 400
13	.511 810	43	1.692 910	73	2.874 010	115	4.527 550	330	12.992 100
14	.551 180	44	1.732 280	74	2.913 380	120	4.724 400	340	13.385 800
15	.590 550	45	1.771 650	75	2.952 750	125	4.921 250	350	13.779 500
16	.629 920	46	1.811 020	76	2.992 120	130	5.118 100	360	14.173 200
17	.669 290	47	1.850 390	77	3.031 490	135	5.314 950	370	14.566 900
18	.708 660	48	1.889 760	78	3.070 860	140	5.511 800	380	14.960 600
19	.748 030	49	1.929 130	79	3.110 230	145	5.708 650	390	15.354 300
20	.787 400	50	1.968 500	80	3.149 600	150	5.905 500	400	15.748 000
21	.826 770	51	2.007 870	81	3.188 970	155	6.102 350	500	19.685 000
22	.866 140	52	2.047 240	82	3.228 340	160	6.299 200	600	23.622 000
23	.905 510	53	2.086 610	83	3.267 710	165	6.496 050	700	27.559 000
24	.944 880	54	2.125 980	84	3.307 080	170	6.692 900	800	31.496 000
25	.984 250	55	2.165 350	85	3.346 450	175	6.889 750	900	35.433 000
26	1.023 620	56	2.204 720	86	3.385 820	180	7.086 600	1000	39.370 000
27	1.062 990	57	2.244 090	87	3.425 190	185	7.283 450	2000	78.740 000
28	1.102 360	58	2.283 460	88	3.464 560	190	7.480 300	3000	118.110 000
29	1.141 730	59	2.322 830	89	3.503 903	195	7.677 150	4000	157.480 000
30	1.181 100	60	2.362 200	90	3.543 300	200	7.874 000	5000	196.850 000

To change decimal millimeters to decimal inches, position the decimal point where desired on either side of the millimeter measurement shown and reset the inches decimal by the same number of digits in the same direction. For example, to convert 0.001 mm into decimal inches, reset the decimal behind the 1 mm (shown on the chart) to 0.001; change the decimal inch equivalent (0.039" shown) to 0.000039".

Decimal Equivalent Size of the Number Drills

Drill No.	Decimal Equivalent	Drill No.	Decimal Equivalent	Drill No.	Decimal Equivalent
80	.0135	53	.0595	26	.1470
79	.0145	52	.0635	25	.1495
78	.0160	51	.0670	24	.1520
77	.0180	50	.0700	23	.1540
76	.0200	49	.0730	22	.1570
75	.0210	48	.0760	21	.1590
74	.0225	47	.0785	20	.1610
73	.0240	46	.0810	19	.1660
72	.0250	45	.0820	18	.1695
71	.0260	44	.0860	17	.1730
70	.0280	43	.0890	16	.1770
69	.0292	42	.0935	15	.1800
68	.0310	41	.0960	14	.1820
67	.0320	40	.0980	13	.1850
66	.0330	39	.0995	12	.1890
65	.0350	38	.1015	11	.1910
64	.0360	37	.1040	10	.1935
63	.0370	36	.1065	9	.1960
62	.0380	35	.1100	8	.1990
61	.0390	34	.1110	7	.2010
60	.0400	33	.1130	6	.2040
59	.0410	32	.1160	5	.2055
58	.0420	31	.1200	4	.2090
57	.0430	30	.1285	3	.2130
56	.0465	29	.1360	2	.2210
55	.0520	28	.1405	1	.2280
54	.0550	27	.1440		

Decimal Equivalent Size of the Letter Drills

Letter Drill	Decimal Equivalent	Letter Drill	Decimal Equivalent	Letter Drill	Decimal Equivalent
A	.234	J	.277	S	.348
B	.238	K	.281	T	.358
C	.242	L	.290	U	.368
D	.246	M	.295	V	.377
E	.250	N	.302	W	.386
F	.257	O	.316	X	.397
G	.261	P	.323	Y	.404
H	.266	Q	.332	Z	.413
I	.272	R	.339		

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Electra Glide FL, FLH
Super Glide FX

This book is intended to serve as a guide to the maintenance, tune-up, and repair of Harley-Davidson Sportster, Electra Glide, and Super Glide models produced from 1965 to 1974. Used properly, it may save time, effort, and money for both the amateur and professional mechanic. The book is broken down into nine chapters which include "Maintenance," "Tune-Up," "Engine and Transmission," "Lubrication Systems," "Fuel Systems," "Electrical System," "Chassis," and "Troubleshooting." Each chapter is clearly written and contains step-by-step procedures, specifications, many illustrations, and helpful hints on taking care of your motorcycle.

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